FOUNDRY TRADE JOURNAL

EST. 1902

WITH WHICH IS INCORPORATED THE IRON AND STEEL TRADES JOURNAL

VOL. 107
No. 2238
Registered at the G.P.O. as a Newspaper

OCTOBER 29, 1959
Offices: John Adam House, John Adam St., London, W.C.2

Single Copy, 1/-. By Post 1/4. Annual Subscription, Home 52/- Abroad 60/- (Prepaid)

o. 4 MOBILE ANDRAMMER

Our newest contribution to Sandramming practice! No. 4 Mobile has 24in. three-bladed 'Turbo-Ram' Head, maximum output 2,000 lbs. per minute. 15ft. radius with feed unit including 7-ton drop-bottom hopper and spare hopper—fully automatic control from head.
Sandrammer is available as stationary model; alternatively 10ft. radius with hydraulic power-assisted head or remote control. Larger models now available.

FOUNDRY EQUIPMENT LTD

LEIGHTON BUZZARD · BEDFORDSHIRE

Telephone: Leighton Buzzard 2441 (5 lines)
Telegrams: 'Equipment,' Leighton Buzzard

ROWLAND

16" – 20" C04 FOUNDRY TYPE ABRASIVE WHEEL CUTTING OFF MACHINE

- ★ UNIVERSAL IN CHARACTER
- ★ EXCEPTIONAL RIGIDITY
- ★ EXTREME SIMPLICITY
- ★ 10, 20 OR 30 H.P. MOTORS AVAILABLE
- ★ POSITIVE NON-SLIP DRIVE
- ★ EARLY DELIVERY

This entirely new machine is the culmination of many years experience in this field. Designed expressly for foundry use, risers and gates of up to 3 in. dia. on a wide variety of castings can be cut off neatly in astonishing times.

Why not consult us, we may be able to help you.

F. E. ROWLAND & CO. LTD.
REDDISH NR. STOCKPORT
TEL. HEA 3201

Sole Export Agents: MESSRS. D. A. (SALES) LTD. HALIFAX HOUSE, STRAND, W.C.2.
TEL. TRA 7229

FOUNDRY TRADE JOURNAL

Vol. 107. October 29, 1959 No. 2238

Established 1902

Incorporating

IRON & STEEL TRADES JOURNAL

Single copy 1s.*; by post* 1s. 4d. *Annual subscription: home* 52s.*, abroad* 60s. (*prepaid*)

Editor:
V. C. FAULKNER. F.R.S.A., HON.M.I.B.F.

Assistant Editor: A. R. PARKES, M.I.B.F.

Commercial Editor: P. E. CARDEN

Advertising Manager:
F. BARRINGTON HOOPER, B.A.

Production Manager:
R. J. LOVELL

Publisher: H. J. DWYER

Circulation Manager: E. T. GRIFFITHS

District Representatives:
G. P. ELLIOTT (Northern Area)
T. H. SMITH (Scotland)
D. C. RYALL (Southern Area)

The FOUNDRY TRADE JOURNAL is the official organ of the British Steel Founders' Association; Association of Bronze & Brass Founders; the Light Metal Founders Association; Foundry Trades' Equipment & Supplies Association; and the National Society of Master Patternmakers.

AN INDUSTRIAL NEWSPAPERS PUBLICATION

Published Every Thursday by Industrial Newspapers, Limited

BARRINGTON HOOPER, C.B.E.
Chairman and Joint Managing Director

F. BARRINGTON HOOPER, B.A.
Joint Managing Director and Commercial Director

F. R. LEWIS, JOHN HOOPER, D. HORN
Directors

E. G. WESTON,
Director and Secretary

JOHN ADAM HOUSE,
17-19, JOHN ADAM STREET,
ADELPHI, LONDON, W.C.2

Telephone: Trafalgar 6171 (*Private Branch Exchange*)

Telegraphic Address: "Zacatecas, Rand, London."

PRINCIPAL CONTENTS

PAGE

Reorganization of a Fettling Shop

Account of the adoption of flow-production methods and installation of new plant at the Edmonton foundry of R. & A. Main, Limited .. 377

Development of a CO_2-Process Moulding Sand

By H. T. Bidwell, A.I.M.

Report of an investigation to produce a CO_2 sand having the characteristics of a conventional mould sand 383

Thermal Efficiency of Drying Stoves

Translation of an article, from a French foundry journal, on how to ensure that mould-drying stoves function correctly 387

New Foundry Amenities installed by Worthington-Simpson, Limited 389

Eccentric Bellfounders of the Mendips

By Ronald Bailey 390

Réorganisation d'un Atelier d'Ebarbage. Compte-rendu de l'adoption de méthodes de production continue, et de l'installation d'un nouveau atelier à la fonderie R. & A. Main, Ltd., à Edmonton. 377

Développement d'un Sable de Moulage pour le Procédé au CO^2. Par H. T. Bidwell, A.I.M. Compte-rendu d'une étude ayant pour but la production d'un sable au CO^2, ayant les caractères d'un sable usuel de moulage. 383

Rendement thermique des Fours á sécher. Traduction d'un article, provenant d'un journal français de fonderie, sur la façon d'assurer le correct fonctionnement des fours à sécher les moules. 387

Neugestaltung einer Gussputzerei. Bericht über die Einführung von Fliessarbeitsmethoden und die Errichtung einer neuen Anlage in der Giesserei der Firma R. & A. Main, Ltd., in Edmonton. 377

Entwicklung eines Formsandes für das Kohlensäure-Erstarrungsverfahren. Von H. T. Bidwell, A.I.M. Bericht über Versuche, die darauf hinzielen, einen für das Kohlensäure-Erstarrungsverfahren geeigneten Formsand zu schaffen, der die Merkmale des herkömmlichen Formsandes aufweist 383

Wärmeleistungsfähigkeit von Trockenöfen. Übersetzung eines Artikels aus einem französischen Giessereifachblatt, in welchem ausgeführt wird, wie man richtiges Funktionieren von Trockenöfen sicherstellt. 387

Features, News, Commercial Information and Statistics

Leader: The Art of Moulding 375
International Foundry Congress 376
European Foundry Apprentice Competition 376
Forthcoming Events 376
National Foundry College 382
Aluminium Street-lighting Columns 382
American Letter 386
Equipment and Supplies 392
News from South Africa 393
British Consortium for Power-station Construction 393
ISI Translations 393
BISRA Open Day 394
Management Luncheon in Sheffield 394
Notes from the Branches 395
BCIRA Lectures on Cast Iron for Engineers 397
National Foundry Craft Training Centre 397
News in Brief 398
Raw Material Markets 400
Company News 401
Current Prices of Iron, Steel and Non-ferrous Metals 404

Unretouched photograph published by courtesy of **Messrs. STERLING METALS LTD., NUNEATON**

Chosen for

Photograph shows Five No. 3F size AUGUST-SIMPSON MIX-MULLERS, fitted with Aerators, feeding mixed sand on to a Distributing Belt Conveyor. Each Mix-Muller has a batch capacity of 4,000 lb.

one of BRITAIN'S LARGEST FOUNDRIES

AUGUST-SIMPSON *Mix-Mullers*

Sole Licensees and Manufacturers for the British Empire (excluding Canada, Australia and New Zealand) of the Simpson Sand Mixer.

AUGUST'S LIMITED - HALIFAX - ENGLAND

Telephone : Halifax 61245/6/7/8 Telegrams : August, Halifax

J.J.M.

FOUNDRY
TRADE JOURNAL

Vol. 107 OCTOBER 29, 1959 No. 2238

The Art of Moulding

For the fifth consecutive year, the British Steel Castings Research Association has held a conference to exchange experiences on some important phase of foundry activities. This year, at Harrogate, the theme was the basic one of mould making. It attracted a high percentage of attendance from this small compact industry, the research activities of which, according to Mr. Frank Rowe, cost more per member than any comparable industry. Despite this, not merely satisfaction is generally expressed, but real enthusiasm is evinced for the work it achieves. Dr. Sully, the director, referred to the extensions now being undertaken at the research station at Sheffield and expressed a confident belief that the extra space being made available would materially benefit the economy of the industry. The testing of some modern plant does make serious demands on floor room.

A feature of the research work being undertaken by BSCRA is the intelligent use that is being made of photography. One outstanding example is a coloured film which shows the effect of heat on a flat cope of a mould. By cutting away a portion of the bottom box and training the camera on the cope during a cast, a colour film was made, which showed materially that with the sand used there was a continuous rain of fine particles. This work has won well-merited approbation at the international scientific and industrial film exhibition. A similar technique has been used to demonstrate the worth of mould paints when subjected to elevated temperatures.

The two-day conference was essentially " down to earth " and this included the contribution made by the guest speaker, Dr. I. J. Petrzela, the Czech foundry expert who was granted a Patent for the CO_2 Process. In his limited command of the English language, he candidly answered the twenty questions put to him by his audience arising out of the film he had taken showing the manufacture of sizeable steel castings by this process. Commenting on the practical aspects of the conference, the chairman, Dr. Hunter, pointed out that costs directly allocated to moulding and coremaking were probably of the order of 15 to 20 per cent, and any departure from good practice had its immediate and adverse impact on the cost of operating the melting, cleaning and dressing, heat-treatment and machining. Everybody must agree with him that a very wise step was taken when it was decided to make the theme of this conference the art of moulding.

International Congress, 1960

The 27th International Foundry Congress, organized jointly by the Association of Swiss Iron Founders and the Association of Swiss Metal Founders, will be held next year in Zurich, Switzerland, from September 19 to 24. The general theme of the Congress will be "Better Working Conditions and Technical Progress in the Foundry Industry," and the technical papers to be presented will be arranged in three groups: (*a*) recent research in the field of foundry techniques; (*b*) modern methods in foundries; and (*c*) the man in the foundry. During the Congress, meetings of the International Committee of Foundry Technical Associations and of various sub-committees and working groups will be held, and visits will be made to Swiss foundries and engineering works.

A brief outline of the programme is as follows. The official opening will take place on the morning of Monday, September 19, at the Congress House, Zurich; in the afternoon there will be technical sessions and meetings of the various committees. The next day, Tuesday, will be devoted to works visits and tours, and on the Wednesday, after technical sessions all day, there will be a social event in the evening. An excursion by steamer on the Lake of Lucerne will take up the whole of Thursday, and on Friday there will be more technical sessions and works visits. The Congress will be officially closed on the morning of Saturday, September 24.

Three post-Congress tours have been arranged, each commencing and finishing in Zurich. The first will take in St. Moritz and Lugano; the second, the Susten Pass, Interlaken, the Jungfrau Glacier and Berne; and the third, Montreux, Gstaad and Berne. A special programme is being prepared for the ladies.

European Foundry Apprentice Competition

Detailed arrangements for the European Foundry Apprentice Competition have now been finalized. The Competition will be held in the Midlands from May 23 to 27, 1960. Those apprentices taking part in the Competition will be housed at Tor Lodge, the hostel of the National Foundry College. The written part of the Competition will be held at the National Foundry College, Wolverhampton, and the Birmingham College of Advanced Technology, whilst F. H. Lloyd & Company, Limited, Wednesbury, have kindly offered space and facilities for the practical tests to be carried out. The competitors, judges and delegates will arrive in Birmingham on May 22, and on Friday, May 27, the party will travel to London for the closing ceremony (including a farewell dinner) and distribution of prizes.

The selection of written questions and practical tests to be used for the Competition was decided upon at a meeting of the judges held last month at the offices of the Council of Ironfoundry Associations. Dr. J. G. Pearce was in the chair at this meeting and representatives from France, Germany, Belgium, Holland, Italy, and the UK were present. Each country submitted a number of questions on technology, calculations and drawing for consideration, and from these, the questions to be used for the actual Competition in May were chosen.

Arrangements to select the English competitors have been made by the Institute of British Foundrymen and, as detailed in the JOURNAL, September 3, will take the form of a competition organized on a national basis. Each candidate will have to undertake both practical and written tests and the results of these will be announced early next year.

Forthcoming Events

NOVEMBER 2

Institute of British Foundrymen

Sheffield branch:—"Co-operation and Co-ordination between Patternshop and Foundry," by E. H. Beech and N. Bradshaw, 7 p.m., at the College of Commerce and Technology, Pond Street, Sheffield.

NOVEMBER 3

Institution of Plant Engineers

"Constructional Problems encountered in the Kariba Dam Hydro-electric Project," by Mr. T. A. L. Paton, B.SC., 7 p.m., at the Royal Society of Arts, John Adam Street, Adelphi, Strand, London, W.C.2.

NOVEMBER 3 to 6

Institute of Welding

Autumn meeting (joint meeting with the French Society of Welding Engineers), at 54, Princes Gate, London, S.W.7. November 3: Works visits for French visitors; in the evening presidential address and reception. November 4: Works visits; annual dinner, 7.45 p.m., at the Park Lane Hotel, London. November 5 and 6: Discussion meetings.

NOVEMBER 4

Institution of Production Engineers

Nottingham branch:—"Adhesives in Engineering," by E. J. Catchpole, 7 p.m., at the Reform Club, Victoria Street.

Institution of Plant Engineers

Dundee branch:—"Design and Operation of the Jodrell Bank Radio Telescope," by C. N. Kington, 7.30 p.m., at Taypark Hotel, West Ferry.

Southern branch:—"Distribution of Electrical Power," by J. Samson, 7.30 p.m., at the Royal Beach Hotel, Southsea.

NOVEMBER 5

Society of Chemical Industry

Corrosion group, and Nottingham section:—"Corrosion Factors affecting the Choice of Stainless-steels for Chemical Plant," by H. T. Shirley, 7.30 p.m., in the Demonstration Theatre, East Midlands Gas Board, 51 to 55, Lower Parliament Street, Nottingham.

Institute of British Foundrymen

Stoke-on-Trent section:—"Modern Developments in Casting Aluminium-base Alloys," by H. J. Proffitt, 7.30 p.m., in the Stipendiary Court Room, Hanley Town Hall.

NOVEMBER 6

Institute of British Foundrymen

Tees-side branch:—"Some Experiences in the Manufacture of Steel Castings for High-pressure Turbine Components," by G. L. Hancock and J. Taylor, at Darlington (details from secretary).

West Wales section:—"Consistent Cupola Operation," by R. Jelley, 7 p.m., at Richard Thomas & Baldwins, Limited, Landore Works.

NOVEMBER 7

Institute of British Foundrymen

Wales and Monmouth branch:—"Consistent Cupola Operation," by R. Jelley, 6 p.m., at the Engineers' Institute, Cardiff.

Latest Foundry Statistics

Light Alloys: The Ministry of Supply belatedly announce that during July the foundry industry manufactured 1,476 tons of aluminium castings from sand moulds, 3,975 tons were made as gravity-die and 1,672 tons as pressure-die-castings. In the same month, 163 tons of magnesium castings were also produced.

Steel Castings: Monthly Statistics, the *Bulletin* issued jointly by the Iron and Steel Board and the British Iron and Steel Federation, indicates another decrease in employment—actually in August it was 320 fewer than on July 4, the total being 17,230. The average weekly production of steel castings during August was 3,900 tons, the same figure as for July; a year ago it was 4,100 tons. It should be noted all these tonnages are estimated.

Reorganization of a Fettling Shop

Adoption of Flow-production Methods and New Plant at R. & A. Main's Edmonton Foundry

Following a brief summary explaining the set-up at the Edmonton foundry, the contributor of this article, Mr. E. Holland, foundry superintendent at R. &A. Main's, first discusses reasons for the changes and then details the alterations. Often, the layout of plant in existing foundries and ancillary shops becomes more and more confused as each new unit is added. Thus, it is sound policy at a time when major equipment changes are being introduced to reconsider the shop as a whole—revising machine position, etc. to suit a new conception of work-flow. This is what Mr. Holland has undertaken and the account records his procedure and the results secured—which include better working conditions, less lifting and transfer within the shop, and not least, higher production at less cost. (This foundry is to be visited tomorrow by a party from the Institute of British Foundrymen).

The main products of R. & A. Main, Limited, of Edmonton, are gas cookers and gas and electric refrigerators. In addition to meeting the requirements for these appliances, the company undertakes castings manufacture as sub-contract work for outside firms. The factory area is approximately 15 acres and some 1,350 personnel are employed, of whom approximately 10 per cent. are engaged in the foundry section. The R. & A. Main foundry comprises a patternshop, coreshop, floor foundry, mechanized foundry* and dressing shop. The coreshop produces approximately 50,000 cores per week and is partly mechanized. The floor foundry averages an output of around 20 tons of iron castings per week and deals chiefly with special orders and castings that are not practicable in the mechanized set-up. The modern mechanized foundry utilizes approximately 90 tons of iron per week and deals with repetitive lines, where castings are wanted in large quantities. Some of the machines make moulds 33 by 23 by 4-in. deep, each part, at the rate of a mould per minute. The castings are mostly light and of thin section, and have a small iron : mould ratio.

In the past, the dressing shop at Main's has had various modifications carried out to plant and equipment from time to time. A short time ago, however, the increased foundry output called for a major revision of dressing-shop practice, and so the whole shop was studied with a view to re-equipping with modern machinery. Following this study, models of equipment were made and placed in various trial layouts, and such things as flow of work, means of access, and safe working-conditions were again considered. Finally, machines were purchased and installed (see layout, Fig. 1). The following account describes these procedures and details the improvements stemming from a logical approach to the various problems studied.

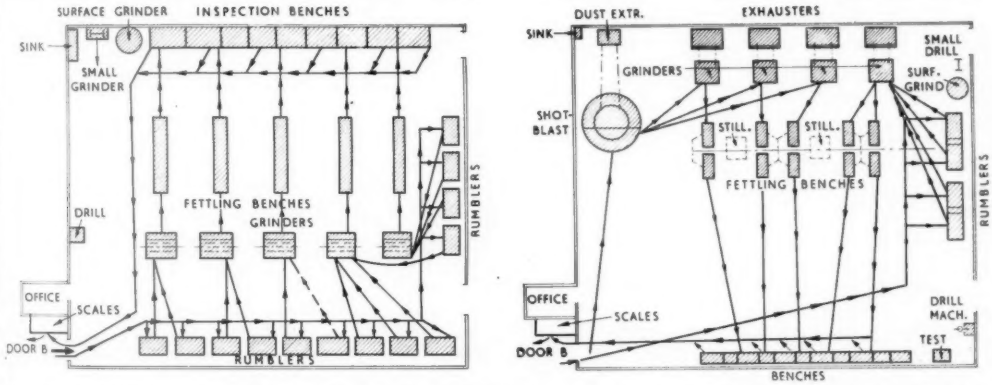


FIG. 1.—*Old (left) and new layout (right) of R. & A. Main's fettling shop. Arrows denote the direction of work flow.*

* Described in the JOURNAL April 13, 1950, under the title "Cast-iron Components for Gas Cookers."

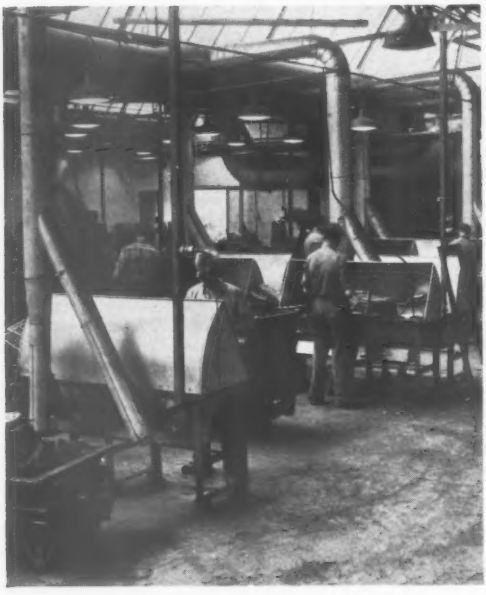


FIG. 2.—*Some of the fettling benches at R. & A. Main's, showing the hoods and extraction method.*

DRESSING-SHOP REORGANIZATION

The dressing of castings poses numerous problems and particularly that of dust control. Further difficulty is created by castings which arrive from the mechanized plant where only part of the sand is removed at the knockout. The R. & A. Main mechanized plant was first installed in 1947 and considerable modifications have been made from time to time to keep it modern, give better sand-control and obtain greater efficiency with corresponding increase in output. This had all increased the strain on the dressing shop which, although it had had some modification, needed to be re-studied in the light of recent Factory Acts, to weigh up the problem anew. Should the existing machinery be modified, or was it better to re-equip with new machinery?

Planning

During the previous twelve months there had been extensive reorganization in company production which had led to expansion of the company's planning department, which guides and advises on reorganization and new ventures, and so permits works executives to carry on with their normal supervisory duties. This service was freely available to cope with the dressing-shop reorganization and greatly assisted in the speed at which the whole scheme was completed. From the date the Board sanctioned the scheme, until completion, only 17 weeks elapsed, and when it is borne in mind that manufacturers seldom have machines in stock, but only build machines against firm orders, it showed that real "drive" was applied.

The study of the various problems of dressing castings was considered in the light of modern development and various authorities were consulted, including the British Cast Iron Research Association and H.M. Inspector of Factories. Their various points of view were carefully considered and had an influence on the types of machines that were finally installed. The main questions to be resolved were: Did the plant and equipment proposed comply with the Factory Regulations; were the new appliances efficient in their manipulation and the amount of work they would do; was their design standard, so as to permit easy purchase of spares as and when required; were they economical to run as regards power? Finally, would the men in the department take kindly to the new equipment? The following gives individually the reasons which influenced the type and make of machine finally chosen and installed.

FIG. 3.—*Inspection benches in the fettling shop at Main's; they have cast-iron legs and removable cast-iron table grids.*

Power Tools

Air-operated grinders to take "pencil" stones had already been in use, but owing to the

FIG. 4.—*Pedestal grinders at Main's, fitted with independent Spencer Halstead dust-arresters and BCIRA dust-extraction units.*

old dressing shop being on the remote end of the compressed-air line, there was seldom sufficient air to maintain the speed of the grinders—with consequent loss in efficiency as well as heavy wear on stones. Two courses were open:—One was to instal a new compressor and the alternative to change over to electrically-driven grinders. Hicycle electric grinders seemed a reasonable proposition and a portable 5-kw. frequency-changer was borrowed, together with a number of Hicycle pencil-stone grinders in order to carry out shop trials. It was found that, compared side by side with air grinders—and on the type of castings in production at R. & A. Main's—these were faster-cutting and owing to their constant speed there was less wear on stones. In addition, it was found that electricity was cheaper than compressed air, Hicycle equipment giving approximately 60 per cent. efficiency against air grinders' 15 per cent.

It was found that eight Hicycle grinders using pencil stones and one 4-in. portable grinder could be driven from a 5-kw. frequency-changer. Air required for air grinders to do the same work would be approximately 1,000 cub. ft. per min., at 90 lb. per sq. in. The frequency changer was also cheaper to purchase than a compressor.

Fettling Benches

Another disadvantage with the air grinders previously in use, was that the air exhaust kept dust in motion and this made it very difficult to extract it efficiently. This was most apparent with the old wooden fettling benches, so it was decided to put in new benches with cast-iron legs and removable cast-iron table grids. Ten of these benches were made and fitted with extraction hoods and also closed-in trays underneath, air extraction being through the grids at the rate of 1,000 cub. ft. per min. for each bench (Fig. 2). Similar benches were made for the castings inspectors, but here it was not considered necessary to fit extraction hoods. These benches can be seen in Fig. 3 along the right-hand wall.

Pedestal Grinders

Five pairs of pedestal grinders using 18-in. dia. grinding wheels had been installed in the shop in 1933, but had been modified from time to time. In the light of the British Cast Iron Research Association's development work on pedestal grinders, consideration was given to further modification using the Dustuctor method of extraction. However, after further study, it was decided to look into the advantages to be gained by purchasing the latest type of high-speed pedestal grinders. The facts that emerged were that the old-type pedestal machines used 18-in. dia. grinding wheels with 1½-in. centre hole, and these were discarded when worn down to 10-in. dia., owing to castings then fouling the guards. There was also a marked falling off in grinding efficiency as the wheels wore down, due to the fact that they were single-speed machines. High-speed grinding proved to be approximately £4 0s. 0d. each cheaper—which was another

FIG. 5.—*Baker Perkins shotblast plant, recently installed at R. & A. Main's foundry.*

advantage. By installing 20-in. double-ended grinders taking wheels with a 7-in. dia. centre hole with speeds variable to give surface speeds of approximately 9,000 ft. per min., a much greater length of life per wheel could be expected with less manual effort in grinding and more consistent efficiency; it was also estimated that where previously there had been five pairs of pedestal machines, owing to faster cutting, etc., with the new set-up, only four pairs were required.

Thus the final decision was made to instal three pairs of Luke and Spencer 20-in. high-speed grinders, of the variable speed type, and one pair 16-in. grinders, with fixed speed, each pair having independent Spencer Halstead dust-extractors. Each grinder has been fitted with BCIRA-type dust-extraction units; these can be seen in Fig. 4 (on the left wall).

Grinding Wheels

Considerable experiments were carried out with various grades and makes of grinding wheels, grades tried varying from a grit bond of 16.S. to 16.O. The former gave a long life but assumed a glaze in use and was heavy on the operator. The 16.O. grit was fast-cutting but the wheel wore down too rapidly causing more dust than was acceptable. The present selection is a grit bond No. 16.P. which seems to provide the best overall solution to Main's requirements.

Rumblers replaced by Shotblast Plant

For many years, castings had been cleaned at Main's in home-made rumbler barrels, thirteen of which were in operation. In these, breakages of castings due to their lightness and thinness of section was relatively high. In the new scheme, it was considered that if a shotblast of the rotary-table type was installed, nine rumbler barrels could be dispensed with, leaving four. It was also thought that there would then be less breakages, and more space for the inspectors to work in, as well as an improvement in dust-extraction facilities for the fettling benches. However, owing to difficulty of removing cores from such castings as gas-burners, etc., it was decided to keep the four rumblers to deal with this specialized type of work.

The shotblast finally chosen was a 7-ft. 6-in. table model (Fig. 5) from Baker Perkins. The reason for the choice of this model was that the machine required no foundation, did not need much head-room and thus no roof alteration was entailed. Additionally, it was easily adjusted for speed and was driven by a rubber-tyred friction drive. This type of drive prevents serious trouble if a jam-up occurs on the table—the rubber tyre merely skidding, no gears being involved. Access for maintenance was easy and delivery time for the model selected was short. For use with this unit, a Spencer Halstead dust-extractor was decided upon, again because the delivery quoted was good and as will be seen, a short delivery period was important as installation of the shotblast was an essential first move to be made in the reorganization.

Choice of Abrasive

Much work has been done by various authorities on the choice of shot grade and type for cleaning castings and so, with a new machine, there was offered an excellent opportunity to try out various types of shot. Cut steel wire was the abrasive tried in the first experiment and, working almost continuously for nine hours per day, one ton lasted 37 days. Angular grit gave only six days operation with one ton, round steel shot gave 38 days and round shot abrasive 35 days. The degree of cleaning appeared to be better with round shot and so this material is being given an extended trial.

Installation Sequence

One essential point in planning the introduction of the new scheme was that there should be no interruption in the flow of work going through the dressing shop—which was then working six days per week. To achieve this, the shotblast was first installed and this took work away from nine rumbler barrels. On taking these out, space was then available to tranfer the inspectors' workplace from the north wall (Fig. 1, left-hand sketch) to this site. This gave room to instal four pairs of pedestal grinders together with their dust-extractors at the north end (right-hand sketch). The grinding-machine operators were then transferred to these new machines and the old pedestal units were

dismantled. This now left dust-extraction units from the old pedestal and the rumblers available for serving the new fettling benches, which were installed in pairs, scrapping the wooden benches as soon as they were replaced.

All this floor planning and layout was based on securing flowability of work. As can be seen by reference to the new layout (Fig. 1) the castings arrive by door B, and pass on to the shotblast, thence to the grinders and back to the fettlers, who finally pass them to the inspectors.

Gas-burner castings, etc., go first to the rumblers and on to the grinders adjacent, they then pass to the fettlers and next to the inspectors. The inspectors pass, count and weigh all castings, weighing taking place adjacent to door B. Assessed on a time-and-motion-study basis this proved a considerable saving in movement of workpieces and caused less congestion, yet gave ample holding space for the inspectors. Castings are taken from the foundry by Lister truck, but movement within the dressing shop is mostly by hand trolley.

Conclusion

In summing up, the advantages gained to date over the five months that this scheme has been in operation are:—First, that speed of fettling has been increased on an average by 10 per cent. (it being borne in mind that although the new machines are much faster there is still the same amount of time taken in picking up and putting down castings, and breakages have been reduced by as much as 70 per cent. of what they were (as, for example, with the casting shown being handled in Fig. 5).

There is some increase in total power requirements of machinery and plant included in the new layout—as was to be expected from the increase in dust-extraction and higher-speed pedestal grinders. The horsepower figures for comparison are shown in Table 1. Shotblasting has been found to give a cleaner casting than rumbling, but does not confer the same polished appearance. Casting defects that would ordinarily only have been discovered in the enamel shop, are made more apparent by shotblasting and this again tends to lower final costs. Replacement grinding wheels are cheaper than previously and appear to be giving as much as 40 per cent. longer life. What is considered to be even more important than the purely financial aspect is that the shop is cleaner, healthier, and altogether more pleasant to work in.

TABLE 1.—*Power Requirements Before and After the Modernization Scheme.*

	Old layout.	New layout.
Air extraction	30	75
Machine	71	80
Compressed air	20	5
Total h.p.	121	160

Acknowledgment

The Author wishes to thank R. & A. Main, Limited, for permission to publish this account, and to acknowledge help from colleagues in its preparation and illustration.

FIG. 6.—*General view of the rearranged dressing shop at the foundry of R. & A. Main, Limited.*

Aluminium Street-lighting Columns

At an exhibition in the Royal Society of Arts, which closed on Tuesday of this week, the Aluminium Development Association showed a number of winning entries and other designs of aluminium street-lighting columns submitted in their recent competition. Briefly, the competition was open to all designers in aluminium, using wrought and cast products, and a particular stipulation was that, although no ceiling was set for price, it had to be borne in mind that eventually the designs would have to be competitive with other street-column materials. Generally speaking, the entries were arranged in two classes, type A, 25-ft. high for trunk roads and type B, 15-ft. high for non-trunk roads. The object of the competition was, of course, to encourage the evolution of good design, taking into account aesthetic appearance, economy of construction, and the advantages of aluminium.

The assessors were the Hon. Lionel Brett, M.A., F.R.I.B.A., F.I.L.A. (nominated by the president of the Royal Institute of British Architects), Professor Sir Alfred Pugsley, O.B.E., D.SC., F.R.S. (past president, Institution of Structural Engineers), and Sir Gordon Russell, C.B.E., M.C., R.D.I., F.S.I.A. (director, Council of Industrial Design). The first prize of £250 was awarded jointly to Mr. J. Howe, F.R.I.B.A., F.S.I.A. (design consultant to A.E.I. Lamp & Lighting Company, Limited, in conjunction with Reynolds T.I. Aluminium, Limited, and Mr. J. B. Dwight, M.A., M.SC., A.M.I.MECH.E. (member of the Civil Engineering Department, University of Birmingham). The second and third prizes were combined (£150) and divided equally between Mr. F. J. B. Rowley (student, College of Art and Industrial Design, Newcastle-upon-Tyne), and Mr. S. L. Devlin (student, Royal College of Art, London). The students' prize (£75) was divided equally between Mr. S. L. Devlin and Mr. F. J. B. Rowley.

Cast Components

All the winning designs and practically every other design exhibited contained cast components in the construction of the columns, some of them quite substantial. For these, die-castings and sand castings were involved, some in LM 6 and others in LM8-W alloys. It was interesting to learn that five manufacturers are presently engaged in production models of aluminium lighting-columns and that a considerable number have already been installed. In most cases, the aluminium extends into the ground anchorage, the metal merely being protected by a bituminous coating.

The Aluminium Development Association are to be congratulated on the sponsoring and the carrying through of this project which, for the metal-producing industries, has as its objective the reversion to metal for components only too often now made in concrete. Lighting columns typify a case where the ironfoundry industry has in the past fought a losing battle against the use of concrete, and it will be pleasing to see a return of metal construction, bringing along with it increasing business for light-alloy founders.

THE REMAINS OF AN IRON-SMELTING WORKS, believed to date from the 17th century, have been discovered at Melbourne, Derbyshire, on a site which is shortly to be submerged for a new reservoir. The discoveries include the remains of a water wheel, believed to have been used to blow air into the furnaces.

Industrial Prospects in the Midlands

At the meeting in Birmingham, on October 20, of the Midland Regional Board for Industry, members were told that Midland industry had shown no disposition to increase its normal intake of apprentices into the skilled trades during the "bulge" years of school leavers. Mr. J. W. Eldridge, Regional Controller for the Ministry of Labour, said that a number of well-qualified school-leavers had had to compromise in their choice of career and accept their second choice. "Apparently there are more youngsters well suited for training in industry than industry is prepared to take," Mr. Eldridge said. "Industry is missing its opportunities," he went on.

The Midland total of unemployment in general had been reduced to 1.2 per cent. it was reported—the lowest level since January 1958. The figure compared with 1.9 per cent. nationally. Reviewing trade prospects, Major C. R. Dibben, chairman of the Board, said that the upward trend continued and the general mood was one of optimism, although perhaps mildly tinged with caution with regard to the long-term view. Exports continued to be satisfactory and there was improvement in the home demand. The reason for the long-term caution, Major Dibben added, was that the heavier industries were not quite so well placed as the lighter ones. Unemployment had fallen in the Midlands from 32,242 in the middle of August to 26,546 in September, and the number of vacancies was 28,220 at the last count.

Major Dibben in referring to steel supplies to the engineering industries said these were beginning to tighten, but there had been no ill-effects on production and the situation was not yet causing much anxiety; no serious complaints about shortage had yet come in.

National Foundry College

Proposed "Sandwich" Course to Start Next Year

Speaking at the dinner of the Foundry Technical Group on October 17, Mr. J. Bamford, principal of the National Foundry College, referred to the paucity of scientific education in this country, *vis-à-vis* USA and Russia, and in this context, announced that the Governing Body of the College had decided to start a three-year Advanced Course for students, to commence in the autumn of 1960. This Course, he said, was definitely not intended to supersede the present Diploma Course, but was a "sandwich" course which would involve students in alternative six-monthly periods at the College and in industry over the three-year periods. The intake would be of two types, viz.: (1) men with a General Certificate of Education at advanced level in two out of three subjects (chemistry, physics and mathematics), and (2) men of similar standing in industry having their Ordinary National Certificate in engineering, chemistry, applied physics or metallurgy. The training curriculum of these students while they were in industry would be decided jointly between the works and the College, and College staff would pay visits to the students while they were getting their works' experience. The new scheme, Mr. Bamford added, should furnish a new type of entrant to the foundry industry, quite outside the scope of the previous schemes. Publicity is to be given to the scheme before Christmas, and it is hoped to start the first course next September, Mr. Bamford said. As to the actual value of the Course to industry, only time will tell. The first students will complete the Course in 1963 and will require some years after that to make their influence felt.

Development of a CO_2-Process Moulding Sand*

By H. T. Bidwell, A.I.M.†

An investigation was carried out to develop a CO_2 sand with the characteristics of a conventional moulding sand. The detrimental effects of clay and moisture on CO_2 sands were overcome by adding a readily ionized sodium salt, to satisfy a base-exchange mechanism between the Sodium/Calcium clay complex and the sodium silicate. The sand produced has been used for production with great success.

When applying the CO_2 process to mould production, several inherent disadvantages become immediately apparent. The low green-strength of the sand does not allow easy removal of the pattern without serious risk of mould breakdown. If the mould is hardened before stripping, a large draw angle on the pattern will be necessary, or excessive rapping of the pattern will be required with subsequent loss of dimensional accuracy. The use of pin-lift-type moulding-machines has been limited, due to the low green-strength of the CO_2 sand. It is not uncommon, when trying to strip a green mould, for a complete breakdown of the mould to occur. Roll-over-type machines have been used successfully, but difficulty in stripping is again encountered with the more complex patterns. The cutting and repair of floor moulds is unsatisfactory, due again to the low green-strength and coarse grain-size of the silica sand usually employed.

Difficulties to be Overcome

The sands used for the CO_2 process are generally described as dry, clay-free, silica sands. The presence of clay and moisture generally makes hardening impossible. If a fine silica sand is used, a high silicate content is necessary to prevent excessive friability. The selection and preparation, such as drying, of a suitable sand all lead to increased overhead costs. If these difficulties could be overcome, the application of the CO_2 process in mechanized moulding would result in cleaner, more accurate castings with large savings on metal melted and machining costs. With these facts in mind, a series of experiments were carried out in the foundry of Glacier Metal Company, Limited, to produce a moulding sand that possessed both the conventional properties of a green sand and the hardening characteristics of a CO_2 sand.

Initial Tests

Early tests were carried out on a sand mixture that was currently in use for core production. This sand consisted of a mixture of Erith silica and Ryarsh silica sands, 3½ per cent. sodium silicate and ½ per cent. breakdown agent. Additions of organic binders such as cereal flour gave a good green-strength, but the shatter index became too high with subsequent poor flowability of the sand. Another major disadvantage was the large volume of gas generated by the binder on casting.

Clay and Water Additions

The next step in the investigation was to determine the effect of clay and water additions to the CO_2 sand. Previous results published by the British Cast Iron Research Association indicated that no more than 2 per cent. clay and 1 per cent. water additions were permissible. Any increase above these levels caused a rapid deterioration in the sand quality. A series of tests were carried out on various mixes, using Ryarsh silica sand and Erith silica sand as the basic raw materials. The sieve analyses for these sands is shown in Table 1.

TABLE 1.—*Sieve Analyses of the Sands used in the Initial Tests.*

Sieve size.	Erith silica.	Ryarsh silica.
+ 36	1.2	0
− 36/ + 52	19.3	0.3
− 52/ + 72	51.9	0.5
− 72/ + 100	23.3	1.2
− 100/ + 150	3.6	41.6
− 150/ − 200	0.6	48.5
− 200	0.3	5.1
Clay, per cent.	0	1.8
A.F.A. Fineness No.	60.8	130

The sand ratios were varied from 50 to 100 per cent. Ryarsh content. The clay content was varied from 1 to 5 per cent., and the moisture content from 1 to 3 per cent. The general trend showed that the gassed strength was not greatly affected by these variations, but the bench life of the sand decreased rapidly with increase in either moisture or clay content.

Sodium Silicate added

In view of the apparent wide tolerance in the clay content, sodium silicate was added to the normal moulding sand used in the foundry. This sand consists of Mansfield Red natural sand, Ryarsh silica and a clay addition. When variations of this basic mix were tested a good green-strength was obtained, and the sand had working properties that were better than the conventional green moulding sand. The sand was satisfactory when newly milled, but soon deteriorated on standing to a state where no hardening was possible.

* This process is the subject of a Patent Application.

† The author is on the staff of Glacier Metal Company, Limited, of Wembley, Middlesex.

CO_2-Process Moulding Sand

Determination of Bench Life

A more detailed series of tests were then carried out on the possibility of using the green moulding sand mix as a basis for a CO_2 moulding sand, the first stage being to determine the bench life of typical mixes. A 10-lb. mix of normal green moulding sand was milled for five min. with a 3½ per cent. addition of sodium silicate. This mixture was then tested until no hardening could be produced on gassing with carbon dioxide. The results are shown in Table 2. It will be noticed that the bench life is only 20 min. A second test with the same sand mix gave only a 17-min. bench life. Item 3 in Table 2 shows a life of one hr. for a sand mix prepared from the raw materials, and not taken from the foundry prepared sand. It was noticed that the sand gradually became powdery without loss in moisture content, accompanied by a fall in the shatter index, and then failed to harden on gassing.

TABLE 2.—*Results of Tests, on three Sand Mixes, to determine Bench Life of typical Sand Mixtures.*

Time (min.).	Moisture (per cent.).	Green-compression strength (lb. per sq. in.).	Shatter index.	Gassed strength, (lb. per sq. in.).	Sand mixture (3½ per cent. sodium silicate added to each batch.) (per cent.).
Batch 1					
0	4.6	6.3	73.7	90	70 Ryarsh silica.
5	4.6	6.7	65.2	90	30 Mansfield Red.
10	4.7	6.6	60.1	90	
15	4.5	5.9	57.7	80	
20	4.6	5.9	57.1	80	
26	4.5	6.2	47.8	Not	
32	4.6	5.7	51.0	harden-	(Used sand)
39	4.6	6.4	45.2	ing	
Batch 2					
0	4.5	6.9	68.0	—	70 Ryarsh silica.
5	4.5	6.9	65.4	90	30 Mansfield Red.
13	4.5	6.9	59.6	80	
17	4.6	6.4	57.1		
22	4.5	6.4	47.9	Not	(Clay addition 6 per
29	4.3	5.9	49.4	harden-	cent. of Ryarsh
34	4.4	6.0	54.0	ing	content).
39	4.4	5.9	47.2		(Used sand.)
Batch 3*					
0	4.3	7.4	85.4	—	60 Ryarsh silica.
5	4.3	6.9	85.9	90	40 Mansfield Red.
11	4.4	7.3	86.6	100	
17	4.6	7.1	86.4	90	(Clay addition 6 per
23	4.5	7.5	88.8	90	cent. of Ryarsh
30	4.6	7.5	86.6	90	content.)
35	4.5	7.6	87.5	80	(New sand.)
40	4.6	7.8	82.9	100	

* After 1 hour the sand ceased to harden.

Significance of Base-exchange Tendency

The deterioration of the sand with time suggested some reaction between the clay and the sodium silicate, and work was directed to examine the possibility of a base-exchange reaction. There are three main clay categories: (1) Kaolinite; (2) Montmorillonite, and (3) Secondary Mica (Illitic). A study of the major clay minerals showed that the montmorillonite group has the greatest base-exchange tendency (see Table 3). Montmorillonite is a hydrated aluminium silicate with loosely held sodium calcium, or other cations, within the structure, giving sodium or calcium

TABLE 3.—*Base-exchange Characteristics of Three Clays.*

Clay.	Base-exchange characteristic.
Kaolinite	3—15 Milli equivalents/100 gm.
Montmorillonite	60—100 ,, ,, ,,
Secondary mica	20—40 ,, ,, ,,

After R. E. Grim.[1]

montmorillonite. Sodium montmorillonite is the main mineral of Wyoming bentonite, whilst calcium montmorillonite is the main constituent of Fullers earth. By adding a small percentage of sodium carbonate to a calcium montmorillonite, an exchange of metal cations occurs to give a sodium montmorillonite and calcium carbonate. When sodium silicate is added to a sand with a high clay content, it is possible that this type of reaction can occur. Norton[2], whilst discussing clay slips, gives the following reaction:

$$(\text{CLAY OH})_2\text{Ca} + \text{CaSO}_4 + \text{Na}_2\text{SiO}_3 \rightarrow 2(\text{CLAY OH})\text{Ca} + \text{CaSiO}_3 + \text{Na}_2\text{SO}_4$$

If the clay mineral has a low base-exchange tendency then this reaction would not be expected to take place. In fact, in Eastern European countries[3], CO_2 moulding sands with good green-strengths are being used. The clays used are mainly kaolins and secondary-mica groups, which, as is shown in Table 3, have a much lower base-exchange tendency than the montmorillonite group.

Kelly and Jenny Theory

The difference in the behaviour of the used and new sand, shown in Table 2, may be accounted for by a theory advanced by Kelly and Jenny. This states that, when considering the sheet-like structure of clays, there are excess negative charges at the edges of the sheets which are satisfied by hydrogen ions or exchangeable cations. When clay is ground there is a crystal breakdown which exposes more negative charges to be satisfied by the cations. Applying this theory to the present problem, it would be expected that used sand would react more rapidly than new sand, since it has undergone mechanical and thermal shock that would break down the clay crystals, thus presenting more unsatisfied charges and hence giving a more rapid reaction.

Sodium Carbonate Addition

If a base-exchange reaction is responsible for the effect of clay in a CO_2 sand, then, by treating the sand with a sodium salt before adding the sodium silicate, the reaction will be satisfied, leaving the silicate intact for the hardening reaction. This was accomplished by adding sodium carbonate to the sand mix and milling thoroughly before adding the silicate. Table 4 shows the results obtained by testing the treated sand over a period of 24 hr. A more protracted series of tests showed that the sand was still in good condition six days after mixing. A cross check was arranged by adding an excess of sodium silicate to the normal moulding sand. This showed a similar but less spectacular increase in bench life. These results are shown in Table 5. Several sodium and potassium salts were used with varying degrees of

TABLE 4.—*Results Obtained from Testing Sand, to which had been added Sodium Carbonate, over a Period of 24 hr.*

Time (hr).	Moisture (per cent.)	Green-compression strength (lb. per sq. in.).	Shatter index.	Gassed strength (lb. per sq. in.).	Sand mixture.
(1) —	4.0	5.1	62.5	—	Basic moulding sand + sodium carbonate.
0	4.8	6.3	79.5	115.5	Basic moulding sand + sodium carbonate + sodium silicate.
1½	—	—	—	69.0	
18½	4.8	6.8	58	51.0	
21½	4.8	5.4	58	51.0	
24	4.8	6.2	52.5	48.0	
(2) —	2.2	7.6	49.6	—	Basic sand.
—	3.2	5.8	69.5	—	Basic sand + sodium carbonate.
0	4.1	5.3	81.5	141	Basic sand + sodium carbonate + sodium silicate.
½	4.1	5.8	83.5	123	
1½	3.8	5.7	79.5	99	
2½	3.8	5.4	77.5	111	
3	4.1	5.9	77.0	112.5	
4	4.0	5.9	75.0	109.5	
5	4.0	6.1	82.0	94.5	
6	3.8	6.0	74.0	102	

effectiveness. The use of sodium carbonate proved to be the most efficient and economical. The application of this process to production work has given excellent results. It is essential, however, to segregate the surplus CO_2 moulding sand from the conventional moulding sand, since a reaction occurs producing the powdery sand effect encountered in earlier experiments. This effect makes conventional moulding impossible, although moisture contents and green-strengths are unaffected.

TABLE 5.—*Results of Tests on Sand having an Excess of Sodium Silicate.*

Time (hr.).	Moisture (per cent.).	Green-compression strength (lb. per sq. in.).	Shatter index.	Gassed strength (lb. per sq. in.).	Sand mixture.
—	3.1	7.2	56	—	Basic sand.
0	4.1	6.3	72.5	103.5	Basic sand and sodium silicate (5 per cent).
2½	—	—	—	55.5	
4½	—	—	—	30.0	
21½	4.4	4.9	47.5	Not gassing	

Conclusion

The work carried out led to the following conclusions:

(1) A CO_2 moulding sand with a high green-strength can be obtained once the base-exchange tendency of the clay bond has been overcome.

(2) The sand must be milled, and not prepared in a paddle-type mixer.

(3) Unused CO_2 moulding sand must not be returned to the mill for use as a green moulding sand. Once the CO_2 sand has been hardened, it can then be reclaimed and milled for use as a green sand.

(4) Castings produced in this way are accurate and of good surface finish. Conventional moulding techniques can be used without special precautions, and the production rates will only differ by the actual hardening time.

Acknowledgments

The author wishes to thank his colleagues L. A. Deaville and R. Cooksey for their enthusiasm and industry during the investigation, and to acknowledge permission to publish the paper from the directors of Glacier Metal Company, Limited.

REFERENCES

[1] Grim, R. E., "Recent Marine Sediments," from a symposium held by the American Association of Petroleum Geologists, Oklahoma, 1939.
[2] Norton, "Refractories" (standard textbook).
[3] Petrezela, L., *Proceedings*, International Foundry Congress, Liège, Belgium, 1958.

No Dividend from North British Locomotive

Chairman of the North British Locomotive Company, Limited, Glasgow, Mr. Thomas Coughtrie, and the vice-chairman, Lord Reith, have warned shareholders that they will not receive any dividend this year. And they may not do so for two or three years.

The statement says there is "a great deal to be done to bring North British Locomotive to rights."

Loss for the half-year to July 10, 1959, is £986,567, and the value of the company to its equity owners is £375,592. The statement recalls that there were changes in the board of directors in June and August. Mr. Coughtrie and Lord Reith list five points which they feel might have been mentioned at the annual meeting of the company in May in order to give shareholders an "accurate and adequate" appreciation of the position. They add that the accounts have been overhauled with the auditors and "stockholders now know the worst."

Production is now being concentrated in one works, and this is expected to improve efficiency. Even so, no immediate improvement in profits to the extent needed for dividend payments can be looked for.

UK Consortium seeks American Steel-plant Contract

MEECO—the UK manufacturing group, Metallurgical Equipment Export Company, Limited, has offered $44,000,000 in credit to finance construction of a steel plant in New Jersey, US. Negotiations are in progress for the award of contracts by the Phoenix Steel Corporation for the erection of a new oxygen plant with an annual capacity of 800,000 tons.

MEECO is a consortium of manufacturers of steelworks plant and equipment and its members involved in the present project are Davy-United, Limited, Head, Wrightson & Company, Limited, Simon-Carves, Limited, and the Wellman Smith Owen Engineering Corporation, Limited.

There is no question of any special UK Government guarantee. If the contract is agreed the Export Credits Guarantee Department can be expected to grant normal export insurance cover and a bank guarantee which will assure the banks concerned of 90 per cent. of the finance involved. Phoenix is one of the smaller steel producers and is not involved in the present strike. Modification of an indenture to permit an increase in the mortgage and total debt of the company would have to be sought, this requiring a two thirds majority of the bondholders.

American Letter

Gas Porosity in Titanium Castings*

Porosity is a major consideration in any casting process. Experimental castings in titanium produced in the author's department were found to contain considerable gas porosity. An investigation was accordingly conducted to determine the causes of the porosity, and to discover how to eliminate it. Precipitated hydrogen has been frequently postulated as a cause, the theory being that the solubility of hydrogen in titanium decreases abruptly upon solidification, thus precipitating hydrogen. However, no reduction in porosity was observed when vacuum-remelted titanium was cast into non-outgassed machined-graphite moulds. The precipitation theory was therefore discarded.

Chloride-vapour Entrapment

There is a strong tendency towards chloride-vapour entrapment in titanium castings. Titanium sponge generally contains quite large amounts of sodium or magnesium chloride, arising from the original reduction process. Quantities of such chlorides detected were sufficient to give partial pressures of 100 to 200 mm. in the voids in castings immediately after solidification, which result agreed reasonably well with the argon pressure of 250 mm. in the furnace. Titanium is, of course, expected to be highly susceptible to inert-gas entrapment, due to its light weight. Two castings were poured under identical conditions, except that one was enclosed in an argon atmosphere, the other in vacuum. Argon entrapment was quite considerable, which emphasized the need for vacuum melting. Another possible cause of porosity in titanium castings is the entrapment of gases liberated by reaction of the molten titanium with the mould material. There was evidence of this when moulds bonded with silicates or other reactive binders were used.

Expendable Graphite Moulds

Of all the techniques tried during the experiments, only the use of expendable graphite moulds resulted in complete elimination of porosity. This mould material may be processed by standard sand-foundry equipment in the first stages of preparation. A final high-temperature firing should be carried out at temperatures up to 1,600 deg. C. in a vacuum, or 1,600 deg. C. in a reducing atmosphere followed by a vacuum firing at 600 deg. C. There will then be only negligible surface contamination, and excellent surface finishes will be obtained on the cast products. The raw materials necessary for producing expendable graphite moulds are cheap, and can be partially re-used. With regard to properties of cast titanium alloys in comparison with wrought forms, the author considers that tensile and impact properties for the as-cast compare favourably to the wrought product. Castings free from gas porosity are now being produced in the author's department by double-melting and vacuum-casting titanium into expendable graphite moulds.

Cope-side Defects in Steel Castings†

Considerable efforts have been made in the last four years to identify the encrusted non-metallic cope-side defects sometimes found on steel castings. The American Foundrymen's Society has sponsored work at the University of Michigan to identify these, and to determine their origin. From microscopic examination, the key feature in the defects appears to be the occurrence of the mineral corundum. The structures discovered are not merely evidence of Al_2O_3, but of a particular crystallite species. Detailed explanation is given in the complete report, to prove that the essential feature of the defect can only occur in the metal as a result of deoxidation with aluminium. Corundum may originate in the ladle, as well as in the metal stream, and later reaction products are formed around it—this agglomerate eventually reaches the cope surface and reacts further with silica and metal oxides. The report recommends that relief from this defect should be sought in mechanical and metallurgical techniques involving investigation of mould-metal reactions with other deoxidation products, and that an investigation of the rate of settling out of these inclusions in the ladle might also be helpful.

America to adopt Metric System?

Senator Neuberger has put forward to the US Congress a bill which provides for a three-year study, by the Department of Commerce, of the practicability and desirability of adoption of the metric system in America. This study would review standards now used in science, engineering and industry, and assess the advantages, and difficulties, of adopting the metric system. The bill has been referred to the Committee on Interstate Foreign Commerce.

Foundry for Dominican Republic

The Dominican Republic shipbuilding and repairing firm of Astilleros Dominicanos, C. por A. has installed foundry equipment at their Rio Haina yards. Machinery costing $400,000 (approximately £134,000) has been imported, and three furnaces of 15, 10, and 5 tons capacity have already been installed in the foundry which has been constructed to allow for future expansion. A 20-ton overhead crane has also been fitted. It is intended that the company shall produce machinery for the Republic's sugar mills as well as a full range of products for other industries. Technicians from the German firms of Erwin Dorten and Dir Burkle will be assisting the company for a year, and will be training Dominican personnel to take over all operations. It is stated by the firm, which is backed by $6,000,000 (about £2,000,000) of Dominican capital, that the only raw material which will have to be imported will be pig-iron. When the foundry is in full production it is estimated that there should be a $1,000,000 saving in annual imports of metal products, but with expansion in demand, this will not affect the volume of trade.

Mr JOSEPH LINDSAY, former chief generator erector of Bruce Peebles & Company, Limited, Edinburgh, died on October 16. One of the pioneering engineers of hydro-electricity in Scotland he supervised the erection of generators throughout the North of Scotland Hydro-Electric Board's area. Mr. Lindsay spent nearly 50 years with the company, joining it as an apprentice in 1910. After the first world war he became a testing engineer, carrying out work in Japan, China, and Korea between 1924 and 1927. He was appointed rotating plant department chief erection engineer in 1948 and held this post for 10 years.

---

* Abstracted from a paper, by M. L. Torti, published by the American Institute of Mining and Metallurgical Engineers in the American *Journal of Metals*. Mr. Torti is attached to the National Research Corporation, Cambridge, Mass.

† Taken from the final report by R. A. Flinn and L. H. Van Vlack (University of Michigan, Ann Arbor) for the American Foundrymen's Society (steel division) research committee.

Thermal Efficiency of Drying Stoves*

An inefficient stove can jeopardize the foundry manufacturing process. The purpose of baking in a foundry is in essence the increasing of the mechanical strength of naturally-bonded moulding sands, and artificially bonded sands for coremaking, so that they can withstand the casting operation. Stoving has also the additional objective of eliminating moisture and volatile matter, and thereby avoiding the occurrence of blowholes in castings. The stove should be operated under conditions which make for full efficiency. It should, therefore, be easily regulated, and its performance subject to control. Tests and steps to be taken to see that this efficiency is secured are given in what follows.

First of all, a test of fuel consumption should be made to show up whether the efficiency is good or bad. Normal consumptions for an actual stove are given in Table 1, according to whether a stove is operating every day, every two or three days, or only once a week, and also according to the fuel used—tar-oil or coke. These figures are for a plant which takes a charge of 5 cwt. of moulds (boxes not included) per cub. yd. and 1½ cwt. of cores (chaplets not included) per cub. yd. The normal charge of a stove should be sufficiently well packed to allow the heat of the combustion gas to be properly used, but also so spaced as to permit circulation of gases. If the figures for the fuel consumption given in Table 1 are exceeded, a methodical examination of the conditions should then be carried out to improve the efficiency of the stove; to do this the following questions should be considered:—

TABLE 1.—*Data Applicable to Foundry Drying Stove Operation. (Fuel Consumption in lb. per cub. yd. of Oven Space.)*

Fuel.	Working conditions.	
	Daily.	Every 2 or 3 days, or once a week.
Tar-oil	4.2 to 6.6	6.6 to 10.0
Coke	6.6 to 10.0	10.0 to 13.3

Search for Improvement

Is the Firebox of Sufficient Capacity?

Initially, it is advisable to make sure that the firebox is adequate in relation to the dimensional characteristics of the stove served. (It should be borne in mind that the stove heating power, on average, can be taken as 7,650 cal. per cub. yd. in the stove. The combustion chamber of the tar-oil burner should have a volume calculated on the basis of one cub. yd. per 380,000 cal. heating potential. Furthermore, to be burned correctly, the fuel should be preheated and suitably atomized. For coke, with natural draft firing, it is necessary to have a hearth area of one square yd. for a combustion of 110 lb. of fuel per hr. In addition, the depth of the fuel bed on the hearth should not exceed ten times the average size of the coke.

Is Combustion Properly Controlled?

The principle of this control is to fix the ratio of the volume of air to that of the fuel used. It can be assumed that a volume of air of from 770 to 1,155 cub. ft. per lb. of coke is required, and from 1,155 to 1,540 cub. ft. per lb. of tar oil. It would therefore be necessary to ensure that the excess of air essential to avoid local overheating in the stove is curbed; if this is not done there is a risk of heavy heat losses in the flue gases. Thus, the excess of air can be lowered in the case where recirculation is used, which permits of economies in this loss.

To ensure that combustion is satisfactory, in the case of tar oil, look at the chimney top. If there is a tendency for black smoke to be given off, this shows that the quantity of air being used is insufficient, or that combustion may have been arrested too soon in a too-low temperature zone. For better results, it is necessary to carry out a gas analysis with an Orsat instrument, with which the CO_2 content can be determined by potash absorption, and unburnt residue determined either by chemical means or by combustion with additional air on a platinum spiral to form secondary CO_2.* Normal values for the CO_2 content will be found to be of the order of 5 per cent. (4 to 7 per cent.) for a non-recirculating stove, and 10 to 12 per cent. (or even lower) for a recirculation stove.

Defective operation of the combustion chamber can be the cause of widespread difficulties. For example, a difficult case arose in a foundry through the appearance of a blowhole type of defect on the surface of certain cored castings. This defect was due to a deposit of incompletely burnt tar-oil on the cores during baking. The imperfect combustion of the tar oil was due to the fact that the steel-sheet combustion chamber had not been lined internally with refractory, which prevented it from reaching a temperature sufficient for the complete combustion of the fuel.

Does the Stove Leak?

Leakiness of the drying chamber directly in-

* Translated from an article in *Journal d'Informations Techniques des Industries de la Fonderie.*

* "Practical Method for the Control of Furnace Atmospheres," *Fonderie*, No. 63, March, 1951.

Thermal Efficiency of Drying Stoves

fluences the efficiency of the stove, and also the uniformity of the interior temperature. Thus, the entry of fresh air, when serious, as for instance under the door, can dilute the combustion gas by increasing flue losses, and so create a cold zone where drying will be imperfect.

With a coke-fired stove, air-tightness influences its performance, and it is best to make certain that the joints of the ash pan door and the entry of the primary air, as well as the joints of the charging door, do close tightly.

On one occasion a fire box (fitted with a reserve supply) with a badly-fitting door was installed so that the flame played upon the apron, obviously involving a great waste of heat and deterioration of the fire box.

Is the Chimney Draught Suitable?

Chimney draught plays an essential part, especially in a natural-draught coke-fired stove, for which the chimney should have an adequate section (about 20 per cent. of the fire-grate surface), and sufficient height (more than 3 ft. above the level of the surrounding buildings). It is also necessary to avoid excessive draught, which causes depression in the stove, thereby facilitating the entry of fresh air; the top of the stove should be under a slight pressure, and it is necessary to limit the zone under negative pressure to the lowest possible level, whilst taking into consideration the efficient functioning of the fire box (a certain amount of negative pressure is necessary for natural-draught furnaces). The pressure/depression plane may be controlled by means of a lighted match passed along the length of a vertical door joint.

In any case, it is necessary to instal a chimney damper, to allow of control throughout the period of stoving. It is desirable also to consider the installation of an inverse flue, by taking the gases to floor level, which makes them take a downward path before their evacuation; by this method a better efficiency, associated with a more even spread of temperature, is obtained.

Is the Temperature Distribution Properly Controlled?

This control is operated by movable slabs placed on the inlet and exit gas flues, as well as by means of dampers situated on the recirculation covers. The general principle is to enlarge the openings in the zones remaining cool, and reduce them in those which are too hot. For core stoves, a preliminary idea of the uniformity of heating can be obtained from the colour attained after stoving by cores placed on test platforms.

Is the Stoving Cycle carried out with Fuel Economy in Mind?

The optimum heating cycle for mould-drying ovens (the time of stoving being 12 to 14 hr., and the depth of drying of the order of 2½-in.) can be defined as follows:

First phase: Raise the temperature to 300 deg. C. in three hr.

Second phase: Maintain the temperature of 300 deg. C. for three hr. (in the case of coke firing the first two phases can be lumped together into one of six hr. giving a progressive rise to 300 deg. C.).

Third phase: Keep the moulds in the stove after shutting off the heat (shut down tar-oil burners, damp down coke-fired grates).

It is wise not to prolong the second phase; the third phase, on the contrary, should be prolonged for as long as possible (at least six hours) to allow of the utilization of the heat accumulated in the already dry sand of the moulds by diffusion inwards (drying right through). There is at the same time an equalization of temperature between various layers of sand which are passing through one of the three phases of drying; so that when the moulds are withdrawn from the stove the risk of cracks due to the existence of an over-heated crust is vastly diminished.

During the third phase of stoving, it is best to shut the chimney completely in the case of tar-oil firing, and partially in the case of coke-fired stoves. This shutting off of the chimney allows drying to proceed actively, in the third phase, through the recuperation of the heat stored in those parts of the moulds which are already dried, or in the stove walls. If some draught was allowed to persist, incoming air would rapidly cool the inside of the stove by removing the heat up the chimney.

Is the Stove Properly Insulated?

It is advantageous, in order to reduce the loss of heat through the brickwork of the stove, to lag the inside of the walls and door with a suitable insulating material. This treatment allows a lower thermal inertia to be obtained, which results in a quicker temperature rise and reduced fuel expenditure. Despite the lower storage of heat in the brickwork, it can be shown experimentally that the cooling of the stove is even slower, because the external losses are likewise greatly reduced. The economy effected in the heating of the brickwork is augmented by the corresponding economy in chimney losses, and together they amount to a fuel saving of at least 20 to 25 per cent.

Mr. J. HUGH NEILL, deputy chairman and joint managing director of James Neill & Company, Limited, steel, tools and magnets, Napier Street, Sheffield, left on Friday, October 23, for a six-week tour of Canada, United States, Mexico and the Caribbean. He is visiting agents and customers in Montreal, Toronto, New York, Chicago, Atlanta, Miami, Mexico City, Jamaica and Trinidad. Canada and the United States are now the firm's third and fourth largest export markets, and the company has a wholly-owned subsidiary in New York.

PEL, LIMITED, of Oldbury, Worcester, a member of the Tube Investment Group, is to receive a "super safety" award which will be presented by the Mayor of Oldbury, Councillor Mrs. E. M. J. Gunn, on November 3. Altogether 29 firms have qualified for these awards in this first year of the scheme. To qualify a firm has to have an accident frequency record below the national average for its trade. The accident frequency rate at Pel, Limited, is .79. The Ministry of Labour average for the industry is 1.55.

New Foundry Amenities installed by Worthington-Simpson, Limited

New foundry amenities and other hygienic equipment have recently been installed at the Newark works of Worthington-Simpson, Limited. The new equipment comprises showers, wash-basins, lead-light mirrors, footbaths, and provision for dirty and clean clothes safeguarded by padlocks with individual keys (see Fig. 1). The installation cost £10,000, and was designed in consultation with representatives of the 180 foundry workers for whom it caters. The rooms are tiled throughout to facilitate hygiene in general and easy washing-down in particular. Water is supplied at a controlled temperature of 110 deg. F., and no effort has been spared to ensure that a complete service is offered for the foundry personnel—there are even sockets for electric razors. Staggered hours permit easy use of the amenities, and a pilot scheme was operated for a few weeks to iron out possible difficulties.

These welfare improvements are augmented by a scheme for the control of dust and fumes in the foundry. The equipment for this was supplied by August, Limited, of Halifax. New sand-mills and sand-storage hoppers with conveyor distribution to the mechanized section have been installed, with fume exhaustion after pouring. After casting, the moulds are moved on a mechanized track to a vibrating knock-out grid with exhaust arrangements. In addition, there is a moving belt to the sand-slinger for the heavy floor-moulding section, the static knock-out also having exhaust facilities.

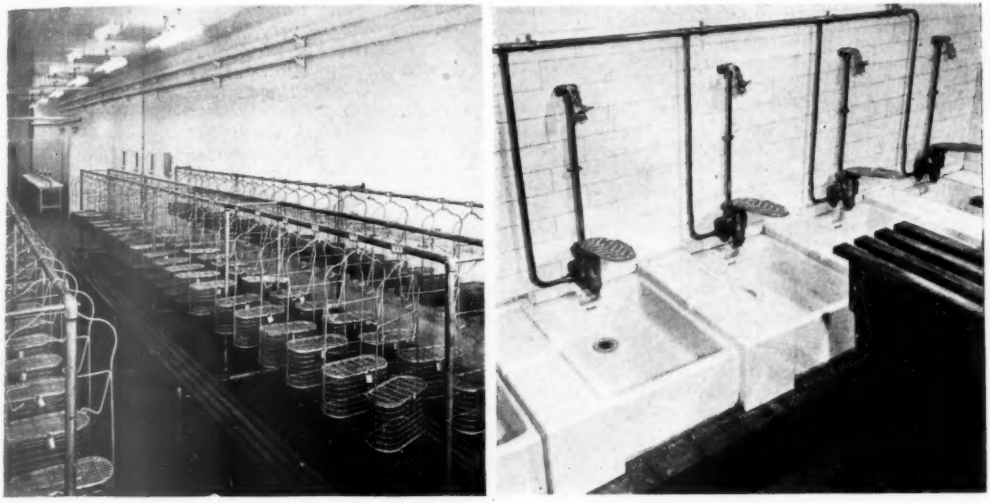


FIG. 1.—*Part of the new foundry amenities recently installed at the works of Worthington-Simpson, Limited—(left) clothes' baskets, each with individual padlocks, and (right) some of the new footbaths.*

F. Perkins's Extension Scheme

Work is to start soon on a £285,000 extension plan at the Eastfield factory of F. Perkins, Limited, the Peterborough diesel-engine manufacturers. It will include the erection of three extra bays at the factory, which employs 6,000 people, and is linked with a development scheme involving additional plant, equipment, and materials handling facilities.

The company's managing director, Mr. M. I. Prichard, announced that peak production this year will be more than 400 engines a day, a figure which will rise to 700 next year. Export sales increased by 45 per cent. during the first six months of this year compared with 1958, excluding engines produced for Massey-Ferguson.

Speed up of Freight Services at Manchester

Following recent reconstruction and modernization, the goods depots of British Railways, London Midland Region, at Ancoats and Ardwick East, are now operating under a new "one-way" system. Traffic previously delivered from the two depots will be concentrated through Ardwick East, and traffic for forwarding will be concentrated through Ancoats. A unified motor fleet will operate for the delivery and collection of traffic.

This "streamlining" of services, with the improved terminal facilities will increase the efficiency in the handling of sundries traffic and will cater for any increase in the tonnage through the two depots. Both depots will be under the control of a goods agent, resident at Ardwick East.

E

Eccentric Bellfounders of the Mendips*

By Ronald Bailey

The village of Chew Stoke, lying in a Mendip dale near the Chew Valley Lake (the new Bristol reservoir), was for at least 150 years the home of the Bilbies, a family of bell and clock makers whose name has become legendary in the West Country. The following article records their exceptional achievements, and describes, in a very entertaining manner, their production methods.

The Bilbie family started business in Chew Stoke, a West Country village, in the 17th century, and continued until about the time of Waterloo. The earliest of their church bells, aptly enough, is to be found at Chew Stoke (1698). Bilbie bells are encountered in Bristol, occasionally in Wiltshire, and all over Somerset. Hardly a Mendip village is without one or more of them. Their largest product seems to be the two-ton tenor bell in Yeovil parish church.

In or about 1745 the second Thomas Bilbie, a freeman of Bristol, broke away from the Chew Stoke business to start the West of England Church Bell Foundry at Cullompton, in Devon. He was in business for 42 years, and supplemented his activities with the making of lead snow-boxes, cisterns, pump faces and similar articles, many of which still exist in that neighbourhood. An unverified story tells how the last of the Devon Bilbies destroyed himself on failing to tune a bell to perfection.

In Devon alone there are said to be 350 Bilbie bells. The Cullompton business was sold to the Pannells in 1813, and they continued it until 1855. The last of the bells from the Chew Stoke foundry are at Wedmore and Chew Magna, both in Somerset and dated 1801.

Legends of the Bilbies

Stories of the Bilbies abound in their native village. Tradition has it that they were a queer, eccentric, clannish family, living very much to themselves in almost gypsy fashion. It is said that they let their hair grow lank and long until it was half way down their backs. Whether they practised a lot of mumbo-jumbo nonsense to impress the clergy and churchwardens, or whether they really had trade secrets unknown to others, it is perhaps futile now to argue; but they sedulously surrounded their craft with an aura of mystery, and it cannot be denied that there are tonal qualities in their bells that place them in a class of their own.

Production Preliminaries

When a parish invited the Bilbies to provide a new bell, and especially when an entirely new peal was needed, a member of the family would arrive in the village and settle himself at the inn. He would seemingly loiter around for several days, undertaking nothing more strenuous than an occasional climb to a hill-top. Back in the village inn he would be very weather-wise, talking of the morrow's wind or rain. Then one day he would announce that conditions were just right, and he would ask for the ringers to be at the church before sunrise.

Before daybreak the bell-maker would make for the nearest pond and, no matter whether it was summer or winter, would strip off everything except trousers and boots and wade into the water until it was up to his neck. Standing motionless until the last ripple had died from the pond's surface he would then give a signal to the ringers to peal the existing bells.

Having correctly attuned his ear to the needful peal the bell-maker would return to Chew Stoke and the family would set to work. Sometimes they spent weeks in preparing the metal ingredients and the moulding loam. Calamine, which was plentiful on Mendip, was said to be one of their secrets, while the loam contained clay, dung, hair and "zummat that can't be spoken of."

Casting Rituals

The Bilbies specialized in tenor bells and these, it was asserted, were always cast in tune without the use of tuning forks and with no chiselling away of bits from the sound bow. The bells were cast either at Chew Stoke or in the churchyard below the tower in which they were to hang. But wherever the casting was done, it was not without its ritual. It was always done on a calm night, at a time of full moon, and after the midnight chimes of the church clock had faded away.

The Bilbies did not object to spectators; indeed, they seemed to welcome them, though the need for absolute quiet was insisted upon, and observers were posted along any approach roads to ensure that no cart rumbled noisily upon the scene to upset the texture of the molten metal. The casting process always ended with buckets of water being thrown on the fire—not to put it out, as the Bilbies explained, but so that the fire, for one brief moment, would flare up hotter than ever, and "that's just what we do want."

Traditions

That their talent was something akin to genius no one will deny; and the Bilbies themselves were in no way modest about their achievements. They inscribed their bells with blatant self-advertisements and disparaging allusions to other bellfounders, and the phraseology was often naïvely rustic. For

* Abstracted from an article, of the same title, which appeared in *Country Life*.

example, at Bruton we encounter:

Once I'd a note that no one could bear
But Bilbie made me sweet and clear.

And at Keynsham:

I value not who doth me see
For Thomas Bilbie casted me.
Although my sound it is but small
I can be heard amongst you all.

A story often told at Chew Stoke is about the time when the Bilbie brothers, having put the melting pot on and got everything ready for making the bell, adjourned to the inn. While they were away their sister came out of the house, and, finding the metal just right for casting, poured it into the mould and produced a perfect bell. The brothers, on their return, smashed the bell and re-cast it. "They felt," it is said, "that no woman should have credit for casting a maiden bell."

Brakeshoe's European Interests

By way of its Swiss subsidiary, Brakeshoe International, the American Brake Shoe Company has acquired hydraulics firms in England and Belgium as a first step in establishing European production and marketing facilities for Brakeshoe International. The English company is Deri (Engineers), Limited, manufacturers of industrial hydraulic pumps and motors, of Shoreham-by-Sea (Sussex), and the Belgian firm, Hydrobel, SA, is the largest in its field in that country.

Mr. W. C. Denison, president of Brakeshoe International, said that within four or five years he envisaged a substantial increase in investment and operations, ultimately amounting to several million dollars in Britain and western Europe.

Mr. C. S. Prendergast will continue as managing director of Deri, and the board will include Major J. Fermor-Hesketh and Mr. J. S. Weyman.

F. H. Lloyd "At Home" to Employees

About six months ago, the JOURNAL carried a report on the Open Day of the F. H. Lloyd group of steelfounders, when their Wednesbury foundry and machine shops received visitors from a wide cross-section of industry. In contrast with this, there was held on a Saturday recently, a function at which the firm's employees, their wives and families, were given the freedom of the works. All that was needed was for the visitors to possess a ticket of admission and then they were at complete liberty to wander at will around the shops. It was indeed inspiring to see the pride with which employees conducted parties of their nearest relatives around, showing them their work-places and introducing them to colleagues. Not least, also, it afforded an opportunity for wives to meet their husbands' workmates—whom they had perhaps heard discussed many times (maybe in terms of affection or the reverse!) but had never previously met face to face. Refreshments were provided in the works canteen throughout the period and displays of products were on view in the foundry, fettling shops and in the machine-shops. Latecomers, however, missed one of the "star" exhibits, because at 9.30 a.m. this impressive casting (illustrated below) left the works on a low-loader road-vehicle bound for the Newcastle-on-Tyne works of C. A. Parsons & Company, Limited, on the final stage of a long journey which is to end in a Commonwealth power-station.

Large turbine-casing leaving the Wednesbury steel foundry of F. H. Lloyd & Company, Limited en route for C. A. Parsons & Company, Limited, Newcastle-on-Tyne

Equipment and Supplies

Mobile Sandrammer

Foundry Equipment Limited, Linslade Works, Leighton Buzzard, Beds., have produced their largest Sandrammer to date in the Senior No. 4 mobile machine (see Fig. 1 (left)). It is designed to meet the increasing demand for large fully-powered locomotive-type Sandrammers for use with large floor-moulds and pit moulds. The machine is fitted with a 24-in. dia. head, and has a total arm radius of 15 ft. (rear arm 9 ft. plus front arm 6 ft.). Its overall dimensions are: length, 35 ft. 10½ in.; width, 8 ft. 4 in., and height, 15 ft. 1½ in.

Triple-bladed Impeller

The head contains a new type of triple-bladed impellor (see Fig. 1 (right)) covered by British and international patents, and is powered by a 50-h.p. motor at 1,440 r.p.m. (giving a blade-tip speed of 9,050 ft. per min.). The sand output (projected through the head) varies between 1,200 and 2,000 lb. per min. A by-pass plough and chute is fitted, to divert loose unrammed sand on to the pattern before the high-density ramming takes place through the head.

Front and Rear Arms

The front-arm 12-in. belt conveyor feeding the impeller is driven through a gear box from the main impeller drive at a speed of 895 ft. per min. The rear-arm belt feeding the impeller belt is 17 in. wide, and is driven by a separate 3-h.p. motor at 740 ft. per min. Both arms of the Sandrammer are actuated by oil hydraulic torque convertors or "slave units" fed by a double pump driven from a 7½-h.p. motor located at the back of the rear arm. The arm speeds are pre-set by flow-valves located beneath the rear arm, but the speed of both arms can be separately adjusted. The movement of the arms is effected by a control column of unusual design, which contains a "dead man's button." If the pressure on this button is released for any reason whatsoever the control circuit is "killed," and the arms come to rest regardless of any movement of the control column.

Operator's seat

The operator's seat is designed to give protection to his legs, and an adjustable flood-light is fitted just behind the head of the machine to facilitate ramming. The seat can be easily pivoted downwards to give immediate access to the Sandrammer head for checking or maintenance purposes.

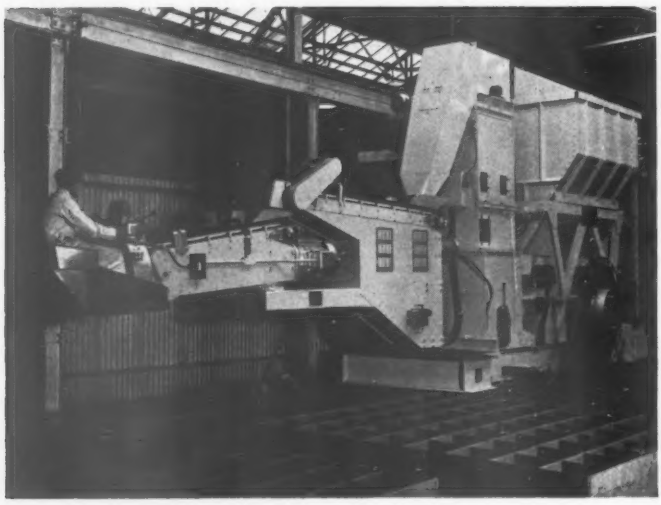
Detachable, and Fixed, Hoppers

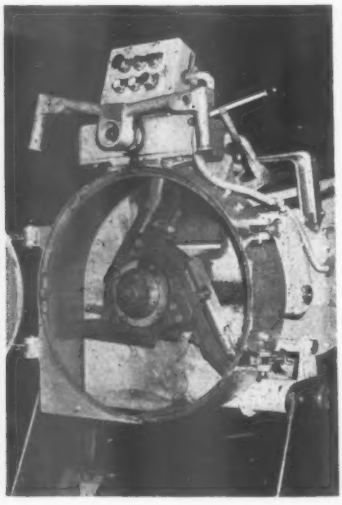
The actual mobile unit consists of a removable hopper with a drop bottom, having a capacity of approximately 6 to 7 tons of sand. Underneath the hopper is a 24-in. wide feeder-belt delivering to a 19-in. belt and bucket elevator. The sand feed system has a maximum capacity of 28 ft. per min (equal to approximately 2,000 lb. of sand per min). A permanent magnet is fitted at the head of the rear conveyor-belt to extract the smaller magnetic ferrous inclusions.

The approximate total weight of the complete Sandrammer without sand is 15 to 16 tons. The machine is supplied complete with a spare detachable hopper, although where required it can be supplied with a fixed hopper, for foundries where a direct distribution belt-feed can be brought over the hopper. In practice, however, it is considered advisable to use the detachable system, so that one hopper is being used on the machine whilst the other hopper is being taken by crane to the sand-preparation plant for filling and return.

The machine is supplied complete with self-winding electric cable reel (standard length of cable up to 200 ft.). To ensure safety up and down the track whilst in operation a high-powered hooter is fitted, which is push-button controlled by the operator. All movements of the machine are within easy hand reach of the operator when he is in the control seat. The patented triple-bladed impeller, and special design of the machine, is claimed to ensure the hardest possible balanced "throw" of sand, and reduce vibration to an absolute minimum. The machine is designed for long-term operation under heavy foundry conditions.

FIG. 1.—*(left) Mobile Sandrammer manufactured by Foundry Equipment, Limited, of Leighton Buzzard; (right) the new triple-bladed impeller, powered by a 50-h.p. motor.*





Tracer Milling Machine: Midgley and Sutcliffe, Limited, Hillidge Works, Leeds, a member of the George Cohen 600 Group, have added a fully-automatic hydraulically-controlled tracer model to their Richmond range of milling machines. The duplex turret milling machine accurately duplicates negative or positive dies for various industries. Twin Hyspeed heads at a fixed centre distance with the Hydrotracer in the centre permit both halves of a mould to be machined simultaneously and identically.

Distribution Rights: Alfred Bullows & Sons, Limited, Long Street, Walsall, announce that they have made an agreement with the Gray Company Inc. of Minneapolis, USA, whereby they have sole distribution rights in the UK for the complete range of Graco industrial equipment, which includes airless spray-painting equipment, heavy-material spray and extrusion equipment, and fluid-transfer equipment.

Hydraulic Equipment: Keelavite Hydraulics, Limited, of Allesley, Coventry, have appointed Holman Bros. (Pty.), Limited, P.O. Box 6218, Johannesburg, as their agent for the sale of hydraulic equipment in South Africa and Rhodesia. Holman Bros. are manufacturing hydraulic cylinders under licence from Keelavite.

ISI Translations

From amongst the most recently published lists of translations available from the Iron & Steel Institute (4, Grosvenor Gardens, London, S.W.1), the following have been selected as being of interest to founders. The price quoted is that for single copies, postage extra, there being reductions for quantities ordered. Readers writing for translations, or for further information, should mention this JOURNAL when doing so.

1378 "ULTRASONIC TESTING OF CAST IRONS WITH LAMINAR AND SPHEROIDAL GRAPHITE FORMATION." Patterson, W., and E. Bodmer, *Giesserei*, 1957, July, pp. 909-917. (£4 15s.) Ultrasonic speed measurements were made for both longitudinal and transverse waves in test-pieces of cast iron with differing textural formations. From the different speeds recorded it is possible to differentiate between a laminar and spheroidal-graphite formation. Using the same measurements it is possible to make an approximation of the modulus of elasticity in shear and in tension, and Poisson's ratio. (Author's summary.)

1368 "DESIGN OF THE SCREWED JOINT OF CRANE HOOKS IN CORRECT RELATION TO THE STRESSES ENCOUNTERED," Maduschka, L., *Stahl u. Eisen*, 1959, vol. 79, May 28, pp. 797-802. (£4.)

1385 "PREVENTION OF GASSING ACCIDENTS IN IRON AND STEEL WORKS," Zillmer, E., *Stahl u. Eisen*, 1959, vol. 79, April 30, pp. 629-634. (£4 5s.)

1447 "DETERMINATION OF THE QUENCHING CAPACITY OF QUENCHING OILS. II—THE VALUE AND SUITABILITY OF VARIOUS TEST PROCEDURES," Schaaber, O., and R. Chatterjee-Fischer, *Industrieblatt* (Stuttgart), 1959, July, 321-324. (£3 15s.) A series of procedures for determining the quenching capacity of quenching oils, proposed in Germany and America, have been investigated for their suitability for standardization. From the results and considerations it is not possible to characterize the quenching capacity of an oil only by a single numerical value. Values in different temperature ranges are needed. For a unique characterization two procedures seem even to be necessary, one showing the behaviour on the surface, and one showing that in the core. The austenitic cylinder and the temperature rise procedures seem to be suitable for standardization. (Author's summary.)

Translations in course of preparation include:—

1440 "MEASURING THE DUST-CONTENT IN INDUSTRIAL GASES AND IN THE AIR: MEASUREMENTS OF THE DUST DEPOSITED ON THE GROUND." Guthmann, K., *Stahl und Eisen*, 1959, vol. 79 (16), Aug. 6, pp. 1129-1141.

1460 "FABRICATION OF LARGE-DIAMETER PIPES IN THE SEDAN FACTORY OF THE SOCIETE LORRAINE-ESCAUT." Petit J., *Techn. Moderne*, 1959, April, pp. 197-206.

1458 "DIGEST ON SAMPLING AND DETERMINATION OF HYDROGEN IN STEEL." A. Stetter, *Stahl u. Eisen*, 1959, July 23, pp. 1087-1090.

News from South Africa

Steelfounding with Zircon Sand

The first metallurgical plant to use power generated from the Zambesi River has been put into operation by Tow Brothers Ironworks, Limited, at Livingstone, adjacent to the Victoria Falls. Power is obtained under off peak conditions at ¼d. per unit, with no maximum demand charge, and it is estimated that there is sufficient natural water storage in the upper reaches of the Zambesi to provide a maximum generating capacity in the dry season of 185 megawatts. Under these conditions, and with nearby Wankie coke available, there would seem to be scope for further electro-metallurgical developments in this area.

At the new plant, the first foundry in Northern Rhodesia to produce alloy- and carbon-steel castings, the initial plant installation consists of a two-ton nominal capacity electric-arc furnace for the production of alloy- and carbon-steel castings, and heat-treating plant is made up of pyrometrically-controlled units supplied by the Wellman Smith Owen Company.

An interesting feature is that zircon sand is being used exclusively for moulds and cores. Whilst zircon facings have been used for many years, this is believed to be the first foundry to operate entirely on zircon sand. This was dictated by the circumstances that manganese steel is a major production and that the adjacent Kalahari and Zambesi alluvials, up to the present, have yielded no silica sand of a permeability suitable for steelfounding.

It is anticipated that the use of zircon sand will enable the initial production of 100 tons of saleable castings, in a production cycle comprising moulding, pouring, knock-out, fettling and sand preparation, to be undertaken within an area of only 600 sq. yd. with consequent saving in handling, moulding-box capacity and services. The sand used is being obtained from the Umgababa, Natal, mine of the Anglo-American Corporation and its long life in use and other advantages are expected to off-set its initial cost. Advisor to the project is Mr. A. G. L. Lewis of Meehanite (Africa) (Pty.) Limited.

British Consortium for Power-station Construction

A new consortium of established British companies—Power Construction, Limited—has been formed to design, manufacture, deliver, and construct "packaged" power stations, burning coal or oil, in any part of the world. The members of the consortium are:—

Armfield Hydraulic Engineering Company, Limited, makers of water turbines, water sluice and scour gates, etc., of Ringwood (Hants); Belliss & Morcom, Limited, manufacturers of steam turbines and engines, oil engines, etc., of Birmingham; Cory Bros. & Company, Limited (a member of the Powell-Duffryn, Limited, Group); Lancashire Dynamo Holdings, Limited, holding company of electrical machinery manufacturers, of London, S.W.1, and the Mitchell Engineering Group, Limited, contracting engineers for complete power stations, of Peterborough.

The range of experience and the facilities of its members enables the consortium to offer a comprehensive and completely integrated service embracing all stages from the planning to the commissioning of power stations and, through the combined organizations, has representation in most parts of the world.

The address of the consortium is:—Power Construction, Limited, 19, Berkeley Street, London, W.1 (telephone: GROsvenor 3801/9).

BISRA Open Days

The British Iron & Steel Research Association arranged a special Press showing of their laboratories at Battersea last week, as a preliminary to two Open Days (October 22 and 23) which were designed to show their member-firms and friends in the industry something of the current work in progress. The JOURNAL'S representative was present, and found some of the research being done to be of particular interest to founders.

For example, in the corrosion department, it has been discovered that, although the corrosion rates of ordinary steel and of copper-bearing steel do not differ appreciably when they are totally immersed in sea-water, the corrosion rate may be roughly halved by the addition of 3 per cent. chromium. Tests have also been made on a number of anti-corrosive paints for ships' hulls and steering gear. The initial tests were carried out on small specimens attached to a raft in the Menai Strait, and the best compositions were subsequently tested by service trials on the hulls of several vessels. One of the best compositions was pigmented with basic lead sulphate, aluminium, Burntisland red and barytes, bound with a modified phenol-formaldehyde resin/stand oil/tung oil medium. It has been found that anti-corrosive paints generally fail to adhere to freshly descaled ship-plate, and that a period of weathering to induce a moderate degree of surface rusting is beneficial to adhesion, provided the final wire-brushing is done immediately before painting. Another research feature of interest to founders—in relation to protection of plant and equipment—is that the BISRA corrosion committee and the British paint industry have co-operated to develop new and better priming paints for structural steel. One of the best protective paints has been found to consist of aluminium/basic lead sulphate in alkyd medium. Other research has consisted of field tests on iron and steel pipes, both with and without protective coatings; bare nodular cast-irons, and iron and steel protected by hot-dipped tar and bitumen coatings. A slate-filled coal-tar pitch has proved to be the best protective coating.

Ergonomics and Safety

Much of BISRA's work in ergonomics has been on the design of crane cabs and crane controls. The older type of cab is considered to be unsatisfactory in several respects; the driver has to stand, the controls are big and awkward to operate, there is no protection from heat, dust or fumes and it is difficult to see out. All these problems have been tackled with success. It has been determined that, for ease and accuracy of operation, the handles of master controllers should move in straight lines and should possess "realism," that is, moving a handle should cause the object controlled to move in the same direction. Controllers should be as small as possible, and hence should have the least number of "notches" consistent with adequate control. More use should be made of foot controls. Experiments in BISRA's laboratories have determined the best position for the pivot of a foot pedal. A very interesting discovery has been made from a poll amongst wearers of safety boots. Out of every 100 men asked why they wore safety boots, 67 said "don't know," 16 said "because they are good quality," 9 said "because they are comfortable," and only three said "for reasons of safety." Eye-appeal would therefore seem to be of the utmost importance in persuading personnel to wear these boots!

Management Luncheon in Sheffield

Addressing members of the Sheffield branch of the British Institute of Management at their first luncheon on October 21, Mr. W. H. Higginbotham, chairman of Edgar Allen & Company, Limited, Sheffield, said that "We in Sheffield have tended rather to make a fetish of quality" but that the concern of customers was with "value in use." Over-elaboration he said was not a good selling point; and though the words "made in Sheffield" were a guarantee of quality, they had little effect on the customer if they were applied to an article or product which was, competitively speaking, out of date. He went on to point out that Sheffield was particularly concerned with requirements of users and consumers, mainly industrial, and that long continuance with a successful product and manufacturing policy might lead to bankruptcy. The marvel of to-day, he said, might be the commonplace of to-morrow, and the obsolete of a year hence.

Colonel Sir Frederick Neill, chairman of James Neill & Company (Sheffield), Limited, said capital expenditure had to proceed with great speed if this country were to hold its own. Mr. Alex Dormer, chairman of the Sheffield Twist Drill and Steel Company, Limited, and chairman of the Sheffield branch of the Institute, emphasized the need for improvement of ideas on production and selling.

Speaking about visitors coming to Sheffield, Mr. Higginbotham said that although manufacturers in Sheffield made great efforts to attract visitors, especially from abroad, they were handicapped by inadequate transport facilities, especially air services, and by a lack of sufficient and suitable hotel accommodation. He suggested that Sheffield businessmen might combine to provide a hotel in the city. He went on "I am told that in Düsseldorf in Germany, and in Gothenburg in Sweden, local businessmen faced with a similar problem built their own hotels with conference rooms and other facilities." He added, "It seems absurd—as we so often have to do—to accommodate our visitors, either privately or miles away in Derbyshire, to say nothing of the inconvenience and loss both of time to them and to us. The impression they get is far from good."

Young Engineers' Prospects

The possibilities of promotion in the automobile industry were compared with those in other industries, when Mr. Stanley Markland, O.B.E., works director of Leyland Motors, Limited, and managing director of Albion Motors, Limited, addressed the 16th annual general meeting of Leyland Motors Engineering Society—a society formed to cater for the younger members of the company.

Mr. Markland said that despite the attractions of the atomic and aeronautical industries, which appealed to some young men with high technical qualifications, the automobile industry had still much to offer. In fact the prospects of advancement offered by the automobile industry were as good, if not better, than any other he knew. "The ever-increasing demand for automobiles indicates a period of prosperity and expansion in the industry for generations to come," he said. "There is room for the best brains that we can muster. For those who have the ability, the rewards are amongst the highest."

Sir Henry Spurrier's annual prize of £25 for the best member of the Society during the year was presented to Mr. B. Hindle, a 25-year-old research technician.

Notes from the Branches

Northampton Section

In September, members of the Northampton & district section of the Institute of British Foundrymen visited the works of Crane, Limited, at Nacton Road, Ipswich. They arrived at 11.0 a.m. and toured the foundries until 1.0 p.m., when they were entertained to luncheon in the works canteen, after which the whole of the afternoon was spent in the works.

The visitors were met by Mr. T. D. Oughton, president of the East Anglian branch, and manager of the malleable foundries, and Mr. R. Y. Peacock, manager of the grey-iron foundries. The whole tour was very interesting and much enjoyed by the visitors.

The company is one of the largest producers in this country of malleable pipe-fittings in sizes of from ⅛ to 6-in. dia. Valves, of ¼ to 24-in. dia., are also produced in cast steel, cast iron and bronze, other products are domestic boilers and radiators, and larger sectional cast-iron boilers for all forms of heating. The works covers an extensive area and employs 2,500 men and women whilst the foundry alone employs some 600.

Grey-iron Foundry

The grey-iron foundry is laid out in five separate moulding units which make radiators, small boiler sections, and valve parts up to 18-in. dia. The radiators are made on special machines peculiar to this firm and of American origin, whilst the largest boiler sections are made on a very efficient slinging machine layout, where power-operated roller-track transfer cars and power-operated moulding-box pushers were observed. The foundry is provided with metal from one cold-blast cupola of 6 tons per hour capacity and a hot-blast cupola of 9 tons per hour, both feeding into receivers. It was said that the cold-blast cupola was soon to be altered to hot-blast as these two furnaces have to melt every day to produce 250 tons of castings per week. Charging was by a drop-bottom-bucket machine.

In the malleable-fittings foundry, batteries of small squeeze machines are used with snap flasks: these produce many tons per week using metal from a large hot-blast cupola which taps into an electric-arc furnace. A new malleable foundry which has been started up is now one-third developed; this is making fittings and is equipped with electric annealing ovens. A very large tonnage per week of bronze castings is made in the non-ferrous foundry, which the visitors found to be very clean, and of a simple and highly efficient layout using a minimum of mechanization.

The coreshop was also well laid out. It was noticed by the guests that a number of the cores were of a complex nature and of particular interest were the radiator cores which are fully vented and carry no reinforcement. It was said that continuous-drying ovens were not suitable for these because, unless the most meticulous care was paid to core drying, there would be a high percentage of scrap.

A large part of the afternoon was taken up in a tour of the machine-shops and valve and boiler assembly lines. It was seen that very fine limits are imposed on fittings because a tap has to be inserted into the cast diameter as no prior machining operation is carried out. The automatic-galvanizing shop was visited as was also the pressure-testing department. The parties finished up in the patternshop and returned for tea in the canteen where the many questions of the visitors were dealt with.

Mr. R. Jelley, branch senior vice-president, proposed a vote of thanks to the company, and commented on the open and frank way in which the plant had been shown and questions answered. Mr. Oughton replied on behalf of the firm, and the visitors left for home at 5.0 p.m. after a very full and instructive day.

Slough Section

On September 29, the Slough section of the Institute of British Foundrymen commenced proceedings for their 1959/60 session with a meeting held in the Lecture Theatre of High Duty Alloys, Limited. Mr. S. J. Williams, section president, was unfortunately unable to attend as he was in hospital, so Mr. H. J. Proffitt read a short address from him. In this, Mr. Williams stressed the importance of members attending as many meetings as possible, even if the topic under discussion was not in their own particular field of interest. He also said that wholehearted entering into the discussions which followed the lectures, was one way of understanding what the other fellow was doing or driving at, and he felt that this was the whole essence of Institute meetings. He concluded by saying that he hoped members would not be shy of taking part in the discussions during his term as president. When the preliminaries of the meeting had been dealt with, Mr. Proffitt introduced the lecturer, Mr. H. G. King, of British Railways, Eastleigh, who presented a paper entitled "Introduction to Patternmaking in Plastics."

Mr. King, who is becoming very well known for his knowledge of the use of plastics for patternmaking, gave a very detailed and explicit account of the manufacture of plastic patterns from the master to the complete pattern. Patterns of various types of manufacture were described, and these ranged from the small patterns, solidly cast in epoxy resin, to the larger patterns, and coreboxes which are built up by a system of lamination. The author gave a wealth of information as to the materials and equipment needed to manufacture plastic patterns, and illustrated his paper with a set of excellent slides. He also had on display a number of finished patterns which were made available for examination by members. A very interesting discussion followed the paper, Mr. King being called upon to answer numerous questions.

A vote of thanks to the lecturer for his exceptionally interesting paper was proposed by Mr. Pitcher, who said he had learnt a lot from Mr. King about "the other fellow's job." Mr. Hoesli, who seconded the vote of thanks, wondered if plastics, as well as helping foundrymen to produce castings, were not also causing some embarrassment to them by replacing metal castings for many uses, particularly in the domestic market. He also congratulated Mr. King on the excellent samples he had on display, and said he was amazed at the degree of finish achieved on these.

East Midlands

The first meeting of 1959/60 session (on October 10) of the East Midlands branch was a works visit to G. Perry & Sons, master patternmakers, of Leicester. No fewer than 120 members foregathered to inspect the workshops of the company and the large number of exhibits displayed on the premises for the convenience of members. Most of the visitors were able to see in th course of preparation one or more items for service in their own works. Following the tour of the works, members were entertained to tea by the company, this being taken in the nearby Aylestone Village Hall.

Notes from the Branches

Evening Meeting

Later in the day, Mr. B. N. S. Perry, the new branch president gave his presidential address at the Leicester College of Technology and Commerce, and took as his subject the theme of development in foundries during the history of the Institute of British Foundrymen, with particular reference to the part played by the East Midlands branch.

The speaker for the evening's technical lecture was Mr. H. G. King who spoke on "The Introduction of Patternmaking in Plastics" (see previous page—Editor). A lively discussion followed, to which 21 members enthusiastically contributed, before the meeting was concluded by a vote of thanks proposed by Mr. S. A. Horton, past-president. More than 120 members were present.

South Africa

The South African branch held a social evening at Pharmacy House Auditorium, Johannesburg, during September, under the chairmanship of Mr. K. H. Coombs, the branch president.

During the evening, by courtesy of British Overseas Airways Corporation the following films were shown:—"The Jet Circle," a film of a colourful journey around the world, with touch downs at San Francisco, Hawaii, Tokyo and Hong Kong; "Gateways to Europe," a travelogue in colour of 15 European countries, showing some of the familiar characteristics of each; "Majesty in the Air," which depicted various historical pageants in a variety of settings throughout Britain, and the last film "Everybody's Flying," was an amusing character study of various personalities from different walks of life, during a night flight. There were approximately 150 members, guests and their ladies present at this function, which was concluded by the serving of refreshments by Mrs. I. R. Duncan and Mrs. John Steele.

Works Visit

Members and guests of the branch, spent a most informative and interesting afternoon recently, touring the plant of National Motor Assemblies (Pty.), Limited, near Johannesburg. Rambler, Peugeot, Hillman and Citroen cars are assembled at this plant, which employs a total of 650 European and non-European employees. Seventeen different models of the foregoing units are assembled, and in any one model there are from two to three thousand parts, ranging from fibre washers to plastic hard-tops. The parts arrive in standard-size packing cases from the UK, USA and France, and the cases contain a variety of parts so packed as to utilize the volume to capacity. At present all body and mechanical parts are imported and only tyres and certain upholstery is supplied locally.

After checking, the parts are transferred to the department known as the "materials-handling section," which is responsible for distribution of all parts to the respective divisions. A complete set of small parts such as spark plugs, bolts, etc., is set out on a specially partitioned trolley which has a job identification number. When the engine or body carrying the same number reaches the section for assembly of the small parts, the trolley is set up to follow the unit until all parts have been exhausted.

Procedure

The works are divided into two units known as Plant A and Plant B, and in Plant A, the first division visited by the guests was the cleaning shop where all sheet-metal parts are dipped in cleaning baths to remove the protective coating with which they were covered for export.

The visitors then inspected the welding shop where the first assembly operation takes place, jigs of different colours being used for each car model. From the jig shop the assembled parts are transported by means of a floor conveyor into the body section for various fittings before entering the paint-preparation department. All painting, by means of spray guns, is manual and there are approximately ten different colours used for all models. Bulk paint mixing is utilized, sufficient paint being mixed for 200 units.

When the car leaves the paint shop it is transported to the sound-deadening department for a coating on the inside of the body of a rubber-based compound which also provides for water proofing. The upholstery shop caters for all fittings of this nature in the car and, after leaving the trim and mechanical line, the body is lowered over the chassis on the finishing line. Before coming off this line the car receives oil and grease, and, prior to inspection, its first supply of petrol. Approximately 130 points are checked in the inspection department and finally the car is given a water test from all angles, by high-velocity jets.

The production of the factory is approximately 24 units per day and the visitors were privileged to see the first models of the I.D. 19 Citroen coming off the assembly line, prior to the official unveiling ceremony by the French Ambassador the following day. The visitors were also shown over the school where mechanics from all over the Union are trained to assemble the new models.

Refreshments were served at the conclusion of the visit and the branch president, Mr. K. H. Coombs, thanked the company and the plant director, Mr. J. R. Edmiston, for their courtesy and hospitality on this occasion.

Wales and Monmouth

The 1959/60 session of the Wales and Monmouth branch opened on Saturday, October 3, with an afternoon visit to the Newport Works of Black Clawson International, Limited (W. A. Baker section), the party being met by Mr. J. C. Wood, foundry manager.

The tour of the works, which was conducted by guides in parties of ten, included the patternshop, iron and steel foundries, and the machine-shop. At the conclusion of the tour, tea was provided by the company, and at this point Mr. R. S. Turner, branch president, thanked the firm for its generous hospitality, also for its courtesy in arranging the visit. Works visits, said Mr. Turner, were a very important part of the Institute's activities, and the W. A. Baker section had been hosts on more than one occasion. Mr. Wood acknowledged the vote of thanks on behalf of his directors.

After tea, Mr. B. N. S. Perry presented a paper on "Modern Methods in Pattern Production," using an excellent series of lantern slides to illustrate his points. He subsequently dealt very ably with questions during the discussion which followed.

Mr. Gordon Jones proposed a vote of thanks to Mr. Perry for a most interesting and instructive lecture, and Mr. Stribblehill, a patternmaker himself, also expressed his appreciation in seconding the proposal. Mr. Perry acknowledged the vote of thanks and the meeting closed.

Mr. C. W. V. DAVIS, a director of Research and Control Instruments, Limited, will head the newly-formed industrial products division of the company.

Weir-Catton's New Foundry

On Monday, October 19, liquid steel flowed for the first time from the electric high-frequency furnaces at the works of Weir Foundries, Limited. It was only six months ago that the first top soil was removed from the site and building commenced on the new works to cover 140,000 sq. ft. of the 30-acre site; part of an area scheduled for industrial development at Knowsthorpe, Leeds. The close co-operation of officials of Local Authorities and Public Services helped considerably in bringing about the rapid progress in building and plant installation. The programme of erection was prepared by the architects, Drawing Office (Baldock), Limited; the consultants were R. F. Ottignon and Partners, Limited, and contractors included Henry Barrett & Sons, Limited, Bradford, Templex Holdings Steel Construction Company, Limited, Bolton, and M. Harrison & Company (Leeds), Limited.

The plant has been designed to produce stainless-steel and special alloy castings by modern processes, and layouts have been decided having regard to the most-efficient techniques developed in the United Kingdom, United States and European foundries. Some specialized equipment of the type not available in this country has been imported, with the objective of improving foundry working conditions and increasing productivity. Of the total building area erected, 50,000 sq. ft. has been allocated for centralizing common services with the other subsidiary of the group, Catton & Company, Limited, steelfounders, Hunslet, Leeds, which company has developed rapidly in recent years with the consequent utilization of all its available space. The emphasis on future development at Knowsthorpe will be to satisfy the requirements of the engineering industry for high-quality precision-made castings.

The new works will be operated by Weir Foundries, Limited, a wholly-owned subsidiary of Weir-Catton, Limited, the board of which consists of Lord Weir (chairman), Mr. J. W. Atwell, Mr. S. L. Finch, managing director, Mr. F. J. B. Henderson, Mr. J. R. Lang, Mr. W. H. Morton, sales director, and Mr. S. Snowball, financial director.

Iron and Steel Institute

At the invitation of the Council of the University of Sheffield. G. V. Kurdjumov, director of the department of metallography and metal physics, Central Research Institute for Ferrous Metallurgy, Moscow, will deliver the twelfth Hatfield Memorial Lecture. He will take as his subject "Phenomena occurring in Steels during Quenching and Tempering," and the lecture will be given on Wednesday, November 25, at 6.30 p.m. in the Firth Hall of Sheffield University.

The autumn annual general meeting of the Iron and Steel Institute will be held in London on Wednesday and Thursday, December 2 and 3. The technical sessions, some of which will run simultaneously, will be held in the Great Hall, Caxton Hall, London, S.W.1 and in the Hoare Memorial Hall, Great Smith Street, London, S.W.1. The sessions will be divided in five sections, *viz*. Session A: Forging; session B: extrusion; session C: fuming in steelmaking furnaces; session D: carbides and nitrides in steels; session E: controlled transformation, and session F: tempering of steels. Sessions A and B will be held in Caxton Hall, and sessions C, D, E and F, in the Hoare Memorial Hall.

On the evening of Wednesday, December 2, Mr. G. V. Kurdjumov will lecture on "Martensitic Transformations in Metals and Alloys" in the Hoare Memorial Hall, commencing at 6.30 p.m.

BCIRA Lectures on Cast Iron for Engineering

The British Cast Iron Research Association are holding a series of lectures in Glasgow on the use of cast iron for engineering purposes. The lecture programme has been organized in conjunction with the metallurgy department, Royal College of Science and Technology in Glasgow, where the lectures are being held. All the lecturers, with one exception, will be members of the staff of the BCIRA. The purpose of the lectures is to instruct or re-inform the engineer and designer on the metallurgy and properties of cast irons, and to indicate correct principles of design from the aspect of both the foundryman and the user of the casting. Of the 14 lectures included in the programme —and being delivered at 2.15 and 4 p.m.—the 12 remaining are being given on October 29, November 5, November 12, November 19, November 26 and December 3. (The first two lectures of the series were presented on October 22). Practically every aspect of the use of cast iron is included, from the stress/strain properties of cast iron, mechanical properties of malleable iron, influence of alloying elements, corrosion of cast iron, to the design of castings for production and the use of specifications. Enrolment forms for the course of lectures and further details can be obtained from the secretary, Royal College of Science and Technology, Glasgow, C.1, the fee for the course being £3 3s.

National Foundry Craft Training Centre

Below are given the opening and closing dates of the courses for 1960, arranged by the management committee of the National Foundry Craft Training Centre, West Bromwich. Some will take place at the Training Centre and others, by agreement with the Stanton Ironworks Company, Limited, at that company's Training Centre, near Nottingham.

Opening date.	Closing date.	At NFCTC centre.		At Stanton.	
		Term.	Course.	Term.	Course.
1959	1960				
December 28 ..	January 21 ..	119	4th	1198	2nd
1960					
January 25 ..	February 18 ..	120	3rd	1208	2nd
February 22 ..	March 17 ..	121	1st	1218	2nd
March 21 ..	April 14 ..	122	3rd	1228	2nd
Easter: April 15 to 19					
April 20 ..	May 13	123	1st	1238	2nd
May 30	June 23 ..	124	1st	—	—
Whitsun: Monday, June 6					
June 27 ..	July 22 ..	125	4th	—	—
August 22 ..	September 16 ..	126	3rd	—	—
September 19 ..	October 14 ..	127	1st	1278	2nd
October 24 ..	November 18 ..	128	4th	1288	2nd
November 28 ..	December 23 ..	129	3rd	1298	2nd

ACCEPTING THE ADVICE of the executive of their union, the Amalgamated Union of Foundry Workers, 240 employees at the Tollcross (Glasgow) works of Stewarts & Lloyds, Limited, decided at Coatbridge last week to end their dispute with the firm. The men came out on strike when 25 workers were declared redundant. They remained out for four weeks and returned to work a fortnight ago on the advice of their union. The Coatbridge meeting was described by Mr. Robert Garland, national organizer of the union, as "somewhat stormy."

News in Brief

BRITISH RAILWAYS (SCOTTISH REGION) have placed a contract with the Butler Machine Tool Company, Limited, Halifax, for the provision of two rail-planing machines for Motherwell permanent workshops.

HORSELEY BRIDGE AND THOMAS PIGGOTT, LIMITED, held their first long-service awards presentation ceremony on October 15 when 157 employees, 13 of them with more than 50 years' service and 144 with over 25 years' service, received gold watches.

THE BRIGHTSIDE FOUNDRY AND ENGINEERING COMPANY, LIMITED, reports in the Brightside group's magazine, that the demand for rolls from the home market is on the increase and that there are substantial export orders from India, Australia, Norway and Canada.

SMALL & PARKES, LIMITED, announce that they have installed TeLEX at their registered offices and works, Hendham Vale, Manchester, 9, and at their London office, 251, Kingston Road, S.W.19. The numbers are:—Manchester TeLEX 66161 and London TeLEX 25439.

THE ACTIVITIES of the United Coke and Chemicals Company, Limited, Orgreave (a branch of the United Steel Companies, Limited), will be featured in a 15-minute film now being made by Wallace Productions of London. It is due to be completed by next spring.

THE ONLY ONE of its kind in the UK, a 26-ton soil stabilizer is being shipped to Persia to work on the £850,000 Khorramshahr Bridge contract being undertaken by the Cementation Company, Limited, London, S.E.11. The machine, which is more than 30-ft. long, is used for road and airfield runway construction.

WORK ON HARBOUR CONSTRUCTION at Rota—the United States Naval Base in Spain—is nearing completion and a contract has been awarded to a British firm, George Cohen Sons & Company, Limited (a member of the 600 Group of Companies) for the disposal of the $3,000,000 plant used in construction.

AS A RESULT of a very considerable increase in turnover on hire-purchase sales and the growing requirement for such services at the lowest possible rates, the British Wagon Company, Limited, in conjunction with Massey-Ferguson (Great Britain), Limited, has reduced the retail rates in the UK under the Massey-Ferguson Pay-As-You-Farm plan.

AT A MEETING of the Council of Wolverhampton Chamber of Commerce on October 19, the president of the Chamber, Mr. D. C. Jemmett, reported far more buoyancy in the steel trade particularly since the general election. Mr. Jemmett said that there had been a recent change in the trend of trade in the area. Labour was still difficult to recruit.

TWO OF THE larger West German steel concerns —Deutsche Edelstahlwerke, AG, of Krefeld, and August Thyssen-Hütte, AG—are to strengthen technical co-operation by the appointment to the Edelstahlwerke board of Thyssen director, Dr. Walter Cordes, and another Thyssen director, Dr. Alfred Michel, to the Edelstahlwerke board of administration.

IT IS REPORTED that the 200 strikers at the Milford foundry of Glow-Worm Boilers, Limited, Derbyshire, who walked out on October 21 in protest against the employment of a 25-year-old Punjabi, have now returned to work. The strikers claimed that the management had failed to honour an agreement not to take on further coloured labour if white labour were available.

NEWCASTLE-UPON-TYNE City Health Committee, which complained to Vickers-Armstrongs (Engineers), Limited, about the fumes from its Elswick foundry, has been informed by the company that the cost of installing and maintaining equipment to deal with the fumes would be prohibitive. The committee is to reconsider the position after talks with the alkali inspector.

A NEW COMPANY, Industrial & Transport Equipment, Limited, has been formed jointly by the General Electric Company, Limited, and Leyland Motors, Limited. Initial capital will be £50,000 in 200,000 ordinary shares of 5s. each. Its object is to take over an existing company, Consolidated Near East, Limited, in which both companies have shared an interest for nearly 30 years.

BUCKLEY AND TAYLOR, LIMITED, of the Brightside group, is to supply for an oil company a large distillation plant. In terms of gross output it is said to be the largest in the world, weighing over 400 tons with each of the eight condensers containing over 10 miles of tubes. The firm is also to supply four large heat-exchangers to the new Hinckley Point atomic power-station.

THE BRITISH COKE RESEARCH ASSOCIATION'S Wingerworth research centre, Chesterfield, was on view to the public on October 17 for the first time since it was officially opened by the Duke of Edinburgh in November of last year. Local residents who had complained about pollution from the NCB carbonization plant alongside, were able to see researchers at work on devising methods of eliminating pollution from all such plants.

A SUBSIDIARY OF Associated Electrical Industries, Limited, Birlec-Efco (Melting), Limited, has acquired a 50 per cent. interest in Efco-Lindberg, a Canadian manufacturer of industrial furnaces. As a result of the move the Canadian company has been re-named Birlefco Lindberg. It will manufacture the complete range of Birlec-Efco and Lindberg melting and heat-treatment furnaces and atmosphere generators at its Toronto plant.

A NEW AGREEMENT between the compressor division of Demag, A.G., Duisberg, West Germany, and William H. Capper & Company, Limited, Warrington (Lancs), appoints the British firm sole representative in the UK for the sale of all the products of the German company's compressor division. They include reciprocating, turbo- and axial-flow and rotary compressors, centrifugal blowers, and a wide range of mining equipment.

ANOTHER ORDER FOR Ruston locomotives has been received by Ruston & Hornsby, Limited, Lincoln, from Colvilles, Limited. It is for 12 Mark 165DE, 150 b.h.p., 28-ton, 0-4-0 diesel-electric units, arranged for single or tandem operation. Five are for Colvilles' Dalzell Works, four for the Glengarnock Works, and three for the Lanarkshire Steel Works. The number of Ruston diesel-electric locomotives ordered by Colvilles since January, 1953, is now 42.

A LICENSEE AGREEMENT between W. H. Allen, Sons & Company, Limited, Bedford, and the Elsinore Shipbuilding & Engineering Company, Denmark, covers the construction of three 720-kw, C.M.R. turbo-alternators for a passenger vessel under construction at Elsinore. The turbines, gears, and condensing plant will be built at the Elsinore yard to the designs and drawings of the Bedford company, which will also supply certain parts for the turbines and gears. The alternators will be of Danish manufacture.

ALL THE CABLING for the lighting and power installations in the new banana warehouse for Elders & Fyffes, Limited, at the British Railways goods yard, Barlby Road, North Kensington, London, was provided by British Insulated Callender's Cables, Limited. Polythene insulated p.v.c. sheathed cables with watertight fittings for lighting are used in the ripening rooms, to avoid rapid deterioration in conditions of extreme humidity and high temperature.

BRITISH HYDRAULIC EQUIPMENT MANUFACTURERS have formed their own association—the Association of Hydraulic Equipment Manufacturers—to meet the need for a central organization to look after the interests of the industry as a whole; to collect and distribute technical information; to advise on exhibitions; and to encourage and to sponsor research for the benefit of members. The offices of the Association are at 38/40, Eccleston Square, London, S.W.1.

ALEX. FINDLAY & COMPANY, LIMITED, have opened new modern office premises and works extensions at their Parneuk Works, Motherwell, at a cost of £80,000. Built on the site of a two-storey tenement, the new three-floor block contains the general office, drawing office, and filing accommodation. A circular staircase tower gives access to all floors. The works extension consists of a 100 by 50 ft. addition to Bay No. 1, with crane rails to permit of it being used in conjunction with the existing shop.

IN AN EFFORT TO INCREASE the number of first-class engineers and scientists for the power industry, the electricity supply industry is to offer 61 university scholarships to grammar and public school pupils. The scholarships will be valid for three years and will be worth £450 at Oxford and Cambridge and £400 elsewhere. Candidates are expected to train in industry for a short time before going to the university and to return for at least two years afterwards. The scholarship will be open to candidates of both sexes.

MR. RUSSELL BAILEY, managing director of Charles Roberts & Company, Limited, railway-wagon builders, Horbury Junction, near Wakefield, has dismissed as "nonsense" the rumours of possible short-time and redundancies at the works. He admitted that as a result of the British Railways' policy to meet their own needs from their own wagon shops, the firm was not likely to get many further orders from that source. However, he said the company had just obtained a contract for 500 wagons for the New Zealand Government Railways, and had also received another substantial order for tankers from a petroleum company. There were sufficient orders on the books to keep the works fully occupied in most departments for at least 12 months.

THE BIRMINGHAM AND DISTRICT INDUSTRIAL SAFETY GROUP held a one-day conference in Birmingham, on October 23, to discuss safety training, when Mr. W. Hewett, of the management consultant firm of Urwick Orr and Partners, told delegates that about 20,000,000 working days a year were lost to British industry as a result of factory accidents. He suggested that executives should give a new lead in training inside the factories and that there should be full-time appointments for safety personnel. Managements, he said, were likely to make considerable savings in production costs if the accident frequency were reduced. The real cost of an accident when it included such items as damaged materials and production downtime, amounted to as much as four times the cost of the pay given to injured operatives away from their jobs. More statistics of accidents were given to delegates by Mr. J. C. Jepson, chief safety officer of Wall Paper Manufacturers, Limited, who said that the number of accidents reported to HM Inspectors of Factories last year was 168,000, with fatal accidents numbering 665. On average about 60,000 workers were absent from their jobs every day because of injuries sustained in accidents. Mr. Jepson also urged that training programmes be intensified in factories where industrial accident frequency could be lowered by an intensive campaign.

Obituary

Mr. L. H. JOSLIN, who died last week, was assistant commercial officer (mineral) of the Eastern Region of British Railways at the headquarters at Liverpool Street.

The death has occurred of Mr. E. W. F. HALL-CRAGGS, M.A., A.M.I.C.E., M.I.B.F. He was managing director of Gascoignes Non-Ferrous Foundries, Limited, of Slough, and died in his 64th year.

Mr. ALEX. HUTCHISON of A. Hutchison & Son, Limited, bath manufacturers of Bow, London, died on October 24. At 83, Mr. Hutchison was still senior director of the firm (founded by his father in 1882), which he joined at the age of 15.

The death has occurred of Mr. JOHN R. WILDER, general manager for more than 27 years of the Willenhall and Wednesfield (Staffs) works of the Yale & Towne Manufacturing Company, manufacturers of locks and materials handling plant, etc. Mr. Wilder was 74.

Board Changes

BLYTHSWOOD SHIPBUILDING COMPANY, LIMITED—Mr. A. G. Bain has been appointed to the board.

JOHN THOMPSON, LIMITED—Mr. Airey Neave, M.P., has been appointed a member of the main board.

BRITISH ENGINE BOILER & ELECTRICAL INSURANCE COMPANY, LIMITED—Mr. R. A. Erskine has joined the board.

ATOMIC POWER CONSTRUCTIONS, LIMITED—Mr. J. W. Ashley, chief engineer, has been elected to the board as technical director.

UNION STEEL CORPORATION (OF SOUTH AFRICA), LIMITED—Mr. E. P. Smith has resigned from the board and Mr. R. C. Elliott has withdrawn as his alternate.

ACHESON COLLOIDS, LIMITED—Mr. Edward A. Smith, executive manager of the parent company, Acheson Industries (Europe), Limited, has been appointed to the board.

BRITISH METAL CORPORATION, LIMITED—Field-Marshal Sir Gerald Templer has been appointed a director and elected chairman of the company, which is a subsidiary of the Amalgamated Metal Corporation, Limited. Mr. A. J. Hugh Smith has resigned as chairman on account of advancing years, but he will remain on the board. Sir Gerald is to be elected a director of the Amalgamated Metal Corporation in November.

Mr. E. MORGAN, general manager in charge of research, the Stanton Ironworks Company, Limited, has been appointed as one of the two representatives of the Joint Iron Council on the Iron and Steel Industry Standards Committee of the British Standards Institution. Mr. Morgan will also represent the Council of Iron Producers. He succeeds Mr. G. H. JOHNSON who has resigned from the Committee after several years' service.

Raw Material Markets

Iron and Steel

Total number of furnaces now in blast is approximately 80, compared with about 86 at this time last year, but overall productive capacity has not declined comparatively, as the furnaces now producing are mostly new and larger units or have been modernized. Outputs of pig-iron at many of these furnaces are below capacity levels and could be increased to meet larger demands. A number of furnaces are still out of blast due to the moderate demand for the grades of pig-iron they normally produce.

Of the total current production of pig-iron basic steelmaking pig-iron absorbs the greater proportion. Larger quantities are now being supplied to steelworks to meet increased consumption rates, but available supplies are ample and more can be supplied when needed. The high percentage of scrap used by the steelworks reduces the amount of pig-iron in their mixtures.

In the foundry grades of pig-iron, producers report an improved demand; more pronounced for some types than others. For low-phosphorus pig-iron the market continues to expand appreciably and, although several brands are now available to the engineering and speciality foundries, some producers are heavily committed and fresh business is being declined at present. Overall production, however, should be adequate to meet the need for some time ahead.

There is also a growing demand for hematite from the engineering and speciality foundries and the needs of the steelworks for increased quantities of ingot moulds and castings have also stepped up demands. The improved call for high-phosphorus pig-iron is maintained, but there are still tonnages to spare and the furnaces hold appreciable amounts in stock. Refined iron makers are also sharing in the improved demands, but would have no difficulty in undertaking fresh business.

Those foundries supplying castings to the motor vehicle trade continue very busy, and demands from that trade are substantial, with current schedules showing an increase. The machine-tool industry is taking up a larger tonnage of castings, and many other trades are also calling for fairly good tonnages, so that the foundries supplying can obtain reasonable outputs. There is only a moderate call from the collieries and railways, and the light-castings trade could undertake much more business, although those supplying castings to the domestic utensil trade are getting more business which it is hoped will expand even further in the near future.

Scrap supplies to the foundries are in the main satisfactory. Foundry coke deliveries are adequate, and ganister, limestone, and firebricks are easy.

The re-rollers maintain an improved rate of production and demands for small bars and light sections are at a high level. There is a heavy call for reinforcing rods.

The steelworks are sending forward to the re-rollers all available supplies of billets, and orders at present on hand are more than sufficient to absorb current outputs. Fresh business can only be accepted for deferred delivery. The steelworks have no difficulty in disposing of all arisings of suitable re-rolling defectives and crops.

Non-ferrous Metals

Copper has been a strong market in London and at one point last week it was traded in at up to £264 a ton. The outlook is still good and there is no reason why the price should not continue its upward course. Indeed, with supplies of metal for early delivery scarce and demand coming in from the US, Europe, China, and Russia, there seems little in the way of the price continuing its upward surge. In fact, the overall situation is becoming a little desperate as the US copper industry is still idle and a settlement is nowhere in sight, while, in Chile, negotiations between the Braden Company and the striking union have been suspended indefinitely. More than that, the only US custom smelter that has any metal for sale is American Metal Climax, so that there is no quoted price for US customs smelters in New York. For delivery before the end of the year US consumers are paying 36½ cents a pound, equivalent to £292 a ton.

The London market is strong, although its sensitivity was well displayed at the beginning of this week when it was rumoured that the US Government would release copper from the stockpile. This led to a fair reaction and profit taking. But since then there has been an official denial that stockpile copper would be released and the price has gone ahead again. Demand is still concentrated on nearby metal and the premium for cash over three months is now £17 10s. a ton.

The drain on available supplies in London was again reflected in the drop in stocks held in LME warehouses, which fell 993 tons to 9,450 tons at the end of last week.

Zinc continues to be a good market, with the price going ahead strongly. Last week the London quotation gained £3 10s. a ton and current metal price is not far short of £100 a ton. As in copper, demand is concentrated on prompt metal, which is scarce, and the backwardation is £5 a ton. In these circumstances it was not surprising that the US quotation was raised in two stages to 14½ cents a pound, New York, and advanced 1 cent to 13 cents a pound, East St. Louis. However, following the news that the resumption of work in the US steel mills had been postponed, the New York quotation dropped ½ cent to 14 cents a pound and "Prime Western" zinc, East Louis basis, is now quoted as a split price of 12½-13 cents a pound. Trading activity in London is good and prospects are that the price will reach £100 a ton when the inevitable court order is promulgated forcing the steelmen back to the mills.

Lead is quiet in the US, but is experiencing firm conditions in London. This is partially due to a sympathetic movement with zinc. In the US the price is unchanged at 13 cents a pound.

Tin remains unmoved by the international labour disputes and price has remained remarkably stable. In London it is holding steady at around £794 a ton and in the US it is not far short of $1.02 a pound.

THOMPSON MINE in Northern Manitoba, the world's second largest nickel-producing project, is moving rapidly towards completion, Dr. John F. Thompson, chairman of the International Nickel Company of Canada, Limited, said in London on October 16. The unit is scheduled to start its breaking-in period early next year; production at an annual rate of 33,500 tons is planned. The new town of Thompson, named after the company's chairman, will initially provide housing for 8,000 people. The mine, developed at a cost of £3,500,000, will be second in size to Inco's operations in the Sudbury district of Ontario. In 1961, Inco-Canada's combined annual production capacity from its operations in Sudbury and in Manitoba will be 172,000 tons. The Western world attained a new record in annual nickel production capacity in 1958, estimated at 234,000 tons.

Company News

Metal Closures and John Dale Terms

Terms have now been agreed for the proposed merger between Metal Closures, Limited, West Bromwich (Staffs), and John Dale, Limited, makers of non-ferrous collapsible tubes, aluminium and light-alloy castings, etc., of London, N.11. The offer is seven Metal Closures 4s. ordinary shares for every six John Dale ordinary shares and 280 Metal Closures 5s. ordinary for £100 nominal John Dale unsecured loan stock. These terms would give present Metal Closures holders 53 per cent. and John Dale holders 47 per cent. of the combined equity.

If the offer becomes unconditional both companies will pay interim dividends of 11 per cent. and a final of 11 per cent. is then foreshadowed on Metal Closures capital as increased to 7,075,000 shares by full acceptance. This is almost exactly in line with the contribution of each to the group profits on the basis of the directors' estimate of combined profits, before tax, for 1959. Directors of John Dale unanimously recommended their holders to accept the offer and if it becomes unconditional they have undertaken not to sell Metal Closures ordinary for at least three months. They have agreed to accept and have stated that they have no present intention of selling. The offer is open until November 3 or not later than November 17.

If the merger is effected three Metal Closures directors will join the John Dale board, three of whose members will join the Metal Closures board. An extra-ordinary meeting to consider increasing the capital will be held on November 4.

Previously Winterbottom Industries, Limited, had offered 19s. for John Dale ordinary and £228 per £100 of loan stock and holders have the two offers to choose from.

SCOTTISH CABLES (SOUTH AFRICA), LIMITED—Dividend for the year ended June 30, 1959, is cut to 10 (12½) per cent. Trading profits contracted to £134,724 (£170,445) and after tax of £32,000 (£43,200) the net profit is lower at £73,836 (£99,169).

WOMBWELL FOUNDRY & ENGINEERING COMPANY, LIMITED—The final dividend is raised to 12½ (11) per cent., making 17½ (16) per cent. for the year ended July 31, 1959. After lower tax of £19,428 (£26,268) the net profit is up at £23,298 (£19,290).

PARKER, WINDER & ACHURCH, LIMITED, lift and pump manfacturers, etc., of Birmingham—The company has acquired the entire share capital of the Willen Key & Hardware Company, Limited, hardware manufacturers, etc., of London, E.C.1, together with its subsidiaries.

GASKELL & CHAMBERS, LIMITED, engineers, coppersmiths, brassfounders, and pewterers, etc., of Birmingham—An interim of 5 (3¼ per cent. equivalent) is being paid and the directors point out that the increase bears no relation to final distribution. Trading results so far do not indicate that the total for the year is likely to be increased.

PROJECTILE & ENGINEERING COMPANY, LIMITED—Interims are resumed with the payment of 4 per cent. for 1959. A single payment of 6 per cent. was made last year and there was no dividend for 1957. The directors state that the general upward trend referred to in the last report has continued and, coupled with the greater efficiency of the organization, has resulted in improved profits.

PETER BROTHERHOOD, LIMITED, engineers and ironfounders, of Peterborough—A final dividend of 20 per cent. makes 25 per cent. on capital increased by a 50 per cent. scrip issue for the year to March 31, 1959. This is an effective rise of 2½ per cent. over the previous total, which included a special bonus equivalent to 6¾ per cent. Profits were £530,204 (£532,758) and after tax of £250,000 (£292,250) the balance is higher at £280,204 (£240,508).

WALMSLEY (BURY) GROUP, LIMITED, manufacturers of pulp and papermaking machinery, etc., of Bury (Lancs)—The distribution is being effectively raised by 3¼ per cent. to 20 per cent. for the year to June 30, 1959, with a 15 per cent. final. The 1957-58 total of 32½ per cent., prior to the one-for-one scrip issue, included a bonus of 5 per cent. Group profit is £832,501 (£888,317); after tax of £412,950 (£458,538) the net profit is £419,551 (£429,779).

BRUSH ELECTRICAL ENGINEERING COMPANY, LIMITED—The company, which is a member of the Hawker Siddeley Group, Limited, has acquired the motor business of Veritys, Limited, the Birmingham manufacturing electrical engineers, which is in voluntary liquidation, and also the issued share capital of a small company, Althea Electric, Limited, which is represented by two shares of 1s. out of a total authorized capital of £100 in shares of 1s.

HILGER & WATTS, LIMITED, manufacturers of scientific instruments, of London, N.W.1—The company has acquired for 26,000 ordinary 5s. shares the issued share capital of Infra-Red Development, Limited, Welwyn Garden City (Herts). This company specializes in instruments for non-dispersive infra-red gas analysis, a field which will be complementary to the dispersive techniques used by Hilger & Watts. Mr. W. B. Bartley is retained as managing director.

JOSIAH PARKES & SONS, LIMITED, non-ferrous founders and manufacturers of locks, etc., of Willenhall (Staffs)—In their interim report the directors state that during the period since January 1 last output has shown "a very satisfactory increase" over the corresponding period last year and the intake of orders is continuing at a high rate. Group profits are at a higher rate than last year and present indications suggest that the results for 1959 will be "entirely satisfactory."

NEEPSEND STEEL & TOOL CORPORATION, LIMITED—Holders of the 6 per cent. participating preference again receive the maximum 4 per cent. additional dividend. The ordinary dividend is maintained on the £1,019,249 capital with an unchanged 37½ per cent. final for the year to March 31, 1959, and a one-for-four scrip issue is proposed. Consolidated trading profit, after depreciation, is £1,171,742 (£1,339,299) and the net profit, after tax, is £604,371 (£615,046).

STOTHERT & PITT, LIMITED, engineers and ironfounders, etc., of Bath—Final dividend of 15 per cent. is being paid, making 20 per cent. for the year ended June 30, 1959, on a capital increased to £2,000,000 by a one-for-three scrip issue. A year ago there were three payments and the total was equivalent to 18¾ per cent. Group profits are down to £911,060, (£1,024,422), but owing to a lower tax charge of £412,200 (£531,250) the net profit is higher at £498,860 (£493,172).

MODERN ENGINEERING MACHINE TOOLS, LIMITED—There is to be a scrip issue of one £1 7½ per cent. cumulative preference share for every 10 5s. ordinary. A change in the company's name has been approved—to Modern Engineering Developments, Limited. Mr. P. R. V. Wheeler, chairman, states that the results to date in the current year are well in excess of those to the same date last year. There is every prospect that this year will be what he hopes shareholders will regard as "their second year of reward."

Personal

Mr. J. H. SHELMERDINE has been appointed commercial manager of Brown Bayley Steels, Limited, Sheffield.

Mr. D. K. FRASER, managing director of Petters, Limited, is to join the board of G. A. Harvey & Company (London), Limited.

Employed in the foundry and furnace department at the Holwell Ironworks, Leicestershire, for 47 years, Mr. C. H. SIMMONDS has now retired.

LORD BAILLIEU, president of the Dunlop Rubber Company, Limited, has been elected as the first president of the British Institute of Management.

Mr. PETER LOWE has been appointed sales manager of the Coleman-Wallwork Company, Limited, and will be responsible for all aspects of foundry supplies.

Mr. E. WILSON has retired from the post of senior foreign correspondent of Edgar Allen & Company, Limited, Sheffield, after 52 years with the firm.

Mr. DENIS G. FLATHER, managing director of W. T. Flather, Limited, steelmakers, Sheffield, will drive his 1897 Daimler in the London to Brighton rally on November 1.

Mr. L. H. CLEAVER, who represents the Yardley division of Birmingham in the new Parliament is a partner in the firm of Heathcote and Coleman, secretaries for a number of foundry employers associations.

Sir GORDON RUSSELL will assume the presidency of the Design and Industries Association following his retirement from the directorship of the Council of Industrial Design at the end of this year.

Mr. HARRY WILSON, secretary of the Sheffield branch of the Amalgamated Union of Foundry Workers, left on October 24, with other union officials, for an 18-day visit to Moscow and other Soviet cities.

Mr. L. J. SINDEN has been appointed deputy sales director of the domestic appliances division of Allied Ironfounders, Limited, Brook Street, London, W.1, and Mr. K. F. STONE has been made sales manager.

The Pressed Steel Company, Limited, announces that Mr. ROBERT N. DAVIES, works director at Cowley and chairman of the motor-car-body divisional board has been appointed a local director of the company.

Mr. G. W. MILLER, district motive-power superintendent at Bescot in the Birmingham area for the last eight years, has been appointed district motive-power superintendent, Derby, British Railways (London Midland Region).

LORD MILLS, the new Paymaster-General who was Minister of Power in the last government, will be the principal speaker at the annual dinner of the Sheffield Chamber of Commerce at the Cutlers' Hall on November 10.

Guest Keen & Nettlefolds (South Wales), Limited, announces that Mr. A. A. MILLER, who was recently appointed London sales manager, will take up his duties at 66, Cannon Street, E.C.4 (telephone: CITy 5070), on November 2.

Mr. W. S. RICHARDS, director and general manager of Brightside Heating and Engineering Company, Limited, Ecclesfield, has been elected president of the Association of Heating, Ventilating and Domestic Engineering Employers.

Sheepbridge Equipment, Limited, of Chesterfield, Derbyshire, announce the appointment of Mr. J. G. FRANCIS as their technical representative for the Yorkshire and Lincolnshire areas. His address is 11, Peveril Close, Kiveton Park, Sheffield.

LORD RIVERDALE, chairman and managing director of Arthur Balfour and Company, Limited, Sheffield, and Lady Riverdale, re-opened the premises of the firm's sports and social club at Whirlow, Sheffield, after alterations, on October 15.

Mr. H. K. SMITH, chief metallurgist of Thos. W. Ward, Limited, and president of the Laboratory Society, has been elected chairman of the executive Council of the Sheffield section of the National Trades Technical Societies, in succession to Mr. A. BRADLEY.

The Council of the Institution of Naval Architects has awarded the Aluminium Development Association research scholarship in the application of light alloys to ship construction (£600 per annum for two years) to Mr. C. S. SMITH, of the University of Glasgow.

Mr. L. B. DEVINS has been appointed general manager of the Sheffield Wire Rope Company, Limited, of Darnall, Sheffield. The company, which is celebrating its golden jubilee this year, was recently acquired by the Firth Cleveland group of companies.

Mr. M. J. S. CLAPHAM, joint managing director of the metals division of Imperial Chemical Industries, Limited, has been appointed chairman of that division from January 1, 1960. He will succeed Dr. M. Cook who retires from the company's service at the end of the year.

Mr. ALLAN F. CAMPBELL has been appointed secretary of Ernest Scragg and Sons, Limited, textile-machinery manufacturers, Macclesfield, and also of the companies forming the Scragg group. Mrs. A. WALKER, the former secretary, remains a director of both the company and the group.

Mr. JOHN BERNARD SANDHAM, a former assistant manager of the construction department of Vickers-Armstrong, Limited, Barrow-in-Furness, celebrated his golden wedding this month. Mr. Sandham started work at Vickers when he was 14. He was appointed assistant manager in 1945, and retired in 1952.

Mr. HARRY TAYLOR, chief engineering inspector with J. Blakeborough and Sons, Limited, Blakeborough, retired on October 16. He joined the firm as an apprentice fitter in 1909, later becoming a fitter in the erection shop. He was promoted to inspector in 1937, and became chief inspector two years later.

Mr. JOHN MCIVOR has been appointed Scottish-area sales manager, and Mr. G. K. FRAME, Scottish-area sales engineer of the British Materials Handling Division of the Yale & Towne Manufacturing Company, Limited, Wolverhampton. Both will operate from the new sales and service depot at East Kilbride.

Dr. O. P. HANSOM has been appointed technical director of Carter Thermal Industries, Limited, and will be responsible for all research and development within the group companies including Midland Heating & Ventilation Company, Limited. Dr. Hansom was formerly engineering manager of Flexibox, Limited, of Manchester.

Mr. JOHN M. MASLIN, personnel director of Accles & Pollock, Limited, Oldbury, was elected president of the Institute of Personnel Management at the annual general meeting of the Institute at Harrogate on October 10. He will hold the office for two years. Mr. Maslin is president of the Wolverhampton and Black Country branch of the Institute.

Mr. S. H. SKIRROW has been appointed service manager of the Ford Motor Company, Limited. He succeeds Mr. A. F. HARPER who becomes technical assistant to the general sales manager. Mr. E. P. TENCH has been appointed fleet sales manager in succession to Mr. F. T. PHIPPS, who has retired from that position but remains in an advisory capacity to the general sales manager.

Mr. J. H. PECK, for many years manager of the Manchester branch of the foundry supplies section of Thos. W. Ward, Limited, has been appointed manager of the department at its head office, Albion Works, Sheffield. Mr. W. J. SMITH formerly personal assistant to Mr. Arnold Carr, the deputy chairman of the company, has been appointed assistant manager to Mr. Peck.

Mr. DAVID BROWN, aged 32, managing director of the tractor division of David Brown & Sons (Huddersfield), Limited, and his wife, were taken to Leeds Infirmary for treatment following a road accident in Geldard Road, Leeds, on October 24. Mr. Brown was allowed to go home after treatment for a head injury, but Mrs. Brown was detained and later was stated to be "fairly comfortable."

Colonel T. EUSTACE SMITH, chairman and managing director of Smith's Dock Company, Limited, South Bank on Tees, and South Shields, has been elected president of the Shipbuilding Conference, in succession to Sir JAMES MILNE, chairman and managing director of J. Samuel White and Company, Limited, Cowes, Isle of Wight. Mr. ALEXANDER H. WHITE, deputy chairman of Lithgows, Limited, Port Glasgow, has been elected vice-president.

Mr. J. E. SMITH has been appointed managing director of the National Gas and Oil Engine Company, Limited, from January 1. He will also become a member of the Board of Hawker Siddeley Industries. Mr. Smith who is 45 years of age, is at present a director of Richardsons Westgarth & Company, Limited, and managing director of its subsidiary, the North East Marine Engineering Company, Limited. He will resign from these appointments at that date.

Mr. C. S. DINGLEY has resigned from the board of British Industrial Plastics, Limited, after 53 years' continuous service. Mr. HAROLD W. FENDER, managing director of Prodorite, Limited and chairman of the British Chemical Plant Manufacturers Association, has been appointed a non-executive director of the company, and Mr. P. RUSSELL, director of research and development of the company"s subsidiary, B.I.P. Chemicals, Limited, has been appointed an executive director.

Mr. MICHAEL C. POTTS and Mr. PETER SHARP have been appointed directors of Dowty Mining (Canada), Limited. Mr. Sharp has also been appointed general manager. Colonel C. W. KING has resigned as works director of Rotol, Limited, and of British Messier, Limited. Mr. A. E. ATKINS, production controller of Dowty Equipment, Limited, has been appointed general works manager of Rotol and British Messier. The companies are all members of the Dowty group.

Mr. R. MIDDLETON, engineering division sales manager, of Newton Chambers and Company, Limited, Chapeltown, and Mr. D. BRADLEY, chemical engineer in the engineering division development department of the firm, have been awarded the medal of the Coke Oven Managers' Association for the best paper presented in the past year. Another member of the company, Mr. RENNIE SMITH, received a wrist watch to mark his retirement from the post of timekeeper in the excavator factory machine-shop.

Foundry Furnishings

Hark! I hear the Foundry Foreman,
Bellow to the Foundry Storeman,
What have you inside that door man?
HOOKER'S goods I hope!

Why not take a look man,
In my Order Book man?
Hammers, rammers, Die Slick pails,
Wood flour, forks and foundry nails,
Chisels, chaplets, straw in bales,
From HOOKER'S Foundry Store.

Said the Storeman to the Foreman,
We have HOOKER'S goods galore man,
Nothing else goes in that door man,
While I'm in the Store.

Yes, we've all that matters,
Even foundry ratters,
If you've pestilential rats
Try HOOKER'S brand of ratting cats
And keep the news beneath your hats,
Future stocks assured.

W. J. HOOKER LTD

239a FINCHLEY ROAD, LONDON, N.W.3
Telephone : Swiss Cottage 3281-2-3

Current Prices of Iron, Steel, and Non-ferrous Metals

(Delivered unless otherwise stated)

October 28, 1959

PIG-IRON

Foundry Iron.—No. 3 IRON, CLASS 2, 10-ton lots or over: Middlesbrough, £21 6s. 0d.; Birmingham, £20 18s. 3d.

Low-phosphorus Iron.—Over 0.10 to 0.40 per cent. P, 10-ton lots or over, £23 5s. 0d., delivered Birmingham, £23 10s. 0d., delivered Grangemouth.

Cylinder and Refined Irons.—North Zone, £25 6s. 6d.; South Zone, £25 9s. 0d.

Refined Malleable.—P, 0.10 per cent. max.: North Zone, £26 6s. 6d.; South Zone, £26 9s. 0d.

Hematite.—Si up to 2 per cent., S. & P. over 0.03 to 0.05 per cent., 10-ton lots or over: N.-E. of England (local iron), £24 14s. 0d.; Scotland (Scotch iron), Zone S.1, £25 0s. 6d.; Sheffield, £26 2s. 6d.; Birmingham, £26 9s. 0d.; Wales (Welsh iron), £24 14s. 0d.

Basic Pig-iron.—£20 3s. 0d., delivered Staffs, Derbyshire, Notts, Lincs, Rutland, Northants, and Leicestershire in 10-ton lots or over.

FERRO-ALLOYS

(Per ton unless otherwise stated, delivered)

Ferro-silicon (6-ton lots and over).—45 per cent. Si, £40 0s. 0d. to £42 10s. 0d., scale 15s. 0d. per unit, lumpy; 75 per cent. Si, £54 0s. 0d. to £57 10s. 0d., scale 15s. 0d. per unit, lumpy.

Ferro-vanadium.—50/60 per cent., 22s. 6d. per lb. of V.

Ferro-molybdenum.—65/70 per cent., carbon-free, 12s. 10d. per lb. of Mo.

Ferro-titanium.—20/25 per cent., 2-3 per cent. Cu, £250 0s. 0d.; 38/40 per cent., commercially carbon-free, £287 0s. 0d.

Ferro-tungsten.—80/85 per cent., 10s. 3d. per lb. of W.

Tungsten Metal Powder.—98/99 per cent., 13s. 3d. per lb. of W.

Ferro-chrome (6-ton lots and over, lumpy).—4/6 per cent. C, £77 0s. 0d. to £81 0s. 0d., basis 60 per cent. Cr, scale 26s. 0d. to 27s. 6d. per unit; over 6 per cent. C, £74 10s. 0d. to £77 10s. 0d., basis 60 per cent. Cr, scale 26s. 0d. to 27s. 6d. per unit; 2 per cent. C,* 1s. 7½d. to 1s. 10½d. per lb. Cr; 1 per cent, C,* 1s. 8d. to 1s. 11d. per lb. Cr; 0.15 per cent. C,* 1s. 9d. to 2s. 0d. per lb. Cr; 0.10 per cent. C,* 1s. 9¼d. to 2s. 0¼d. per lb. Cr; 0.06 per cent. C,* 1s. 9¾d. to 2s. 0⅜d. per lb. Cr.

Metallic Chromium.—98/99 per cent., 6s. 10d. per lb.

Metallic Manganese.—94/96 per cent., carbon-free, £245 0s. 0d.; 96/98 per cent., £275 0s. 0d.

Ferro-columbium.—65/67 per cent., Cb + Ta, 19s. 9d. per lb., Cb + Ta.

Ferro-manganese (Standard).—78 per cent., £66 0s. 0d.

SEMI-FINISHED STEEL

Re-rolling Billets, Blooms, and Slabs.—BASIC: Soft u.t., 100 tons & over, £31 15s. 6d.; tested, 0.08 to 0.33 per cent. C, 6 to 35 tons, £33 15s. 6d.; hard (0.41 to 0.60 per cent. C), under 10 tons, £34 17s. 0d.; silico-manganese, under 10 tons, £43 16s. 6d.; free-cutting, under 10 tons, £36 14s. 6d. SIEMENS MARTIN ACID (under 10 tons): Up to 0.25 per cent. C, £41 1s. 0d.; silico-manganese, £44 4s. 0d.

Billets, Blooms, and Slabs for Forging and for Stamping (under 10 tons).—Basic, soft, up to 0.33 per cent. C, £38 10s. 0d.; basic, hard, over 0.41 up to 0.60 per cent. C, £39 12s. 6d.; acid, up to 0.25 per cent. C, £43 4s. 0d.

FINISHED STEEL

Heavy Plates and Sections (under 10 tons).—Ship plates, (N.-E. Coast), £42 2s. 0d.; boiler plates (N.-E. Coast), £44 12s. 0d.; floor plates (N.-E. Coast), £43 11s. 0d.; angles (N.-E. Coast), £39 16s. 6d.; joists (N.-E. Coast), £39 12s. 6d.

Small Bars, Sheets, etc.—Rounds and squares, under 3 in., and flats 5 in. wide and under, untested soft basic, 50 tons and over, £39 1s. 0d.; under 10 tons to 4 tons, £40 18s. 0d.; under 4 tons to 2 tons, £41 3s. 0d.; hoop and strip, coils, 100 tons and over, £38 0s. 0d.; uncoated strip mill coils, hot rolled, under 3 mm. to 12g., 25 tons to under 50 tons, £43 16s. 0d.; black sheets (hand mill), 24g., 10 tons and over, £57 14s. 6d.; galvanized corrugated sheets, 24g., 10 tons and over, £67 4s. 0d.

Alloy Steel Bars.—1 in. dia. and up; Nickel, £68 10s. 0d.; nickel-chrome, £99 4s. 0d.; nickel-chrome-molybdenum, £111 17s. 0d., in lots of 5 tons to under 10 tons.

NON-FERROUS METALS

Copper.—Cash, £265 0s. 0d. to £265 10s. 0d.; three months, £247 10s. 0d. to £248 0s. 0d.; settlement, £265 10s. 0d.

Copper Tubes, etc.—Solid-drawn tubes, 2s. 5d. per lb.; rods, 266s. 0d. per cwt. basis; 20 s.w.g., 301s. 0d. per cwt.

Tin.—Cash, £794 0s. 0d. to £794 10s. 0d.; three months, £795 0s. 0d. to £795 10s. 0d.; settlement, £794 10s. 0d.

Lead (Refined Pig).—Second half October, £70 15s. 0d. to £71 0s. 0d.; second half January, £71 12s. 6d. to £71 17s. 6d.

Zinc.—Second half October, £97 0s. 0d. to £97 10s. 0d.; second half January, £92 0s. 0d. to £92 5s. 0d.

Zinc Sheets, etc.—Sheets, 15g. and thicker, all English destinations, £130 0s. 0d.; rolled zinc (boiler plates), all English destinations, £127 15s. 0d.; zinc oxide (Red Seal), d/d buyers' premises, £102 10s. 0d.

Brass Tubes, etc.—Solid-drawn tubes, 2s. 0½d. per lb.; sheets to 10 w.g., 216s. 9d. per cwt.; wire, 2s. 9¾d.; rolled metal, 216s. 9d. per cwt.

Brass (Brazing).—BS1400, B3, £171; B6, £220.

Brass (High Tensile).—BS1400, HTB1, £204; HTB2 £220; HTB3, £234.

Gunmetal.—BS1400, LG2, £214; LG3, £224; G1, 1% £277; G1, 1%, £263.

Phosphor Bronze.—BS1400, PB1 (AID released), £313; BS1400, 90/10/1, £292.

Leaded Phosphor Bronze.—BS1400, LPB1, £232.

Phosphor Bronze Strip, etc.—Strip, 305s. 0d. per cwt.; wire, 4s. 2⅝d. per lb.; rods, 3s. 5¾d.; tubes, 3s. 5¾d.; chill cast bars; solids 3s. 5¼d.; cored 3s. 6¼d. (CHARLES CLIFFORD, LIMITED.)

Nickel Silver, etc.—Rolled metal, 3 in. to 9 in. wide × 0.056, 4s. 0½d. per lb.; round wire, 10g. in coils (10 per cent.), 4s. 5¼d.; special quality turning rod, 10 per cent., ½ in. dia., in straight lengths, 4s. 4¼d. All prices are net.

Other Metals.—Magnesium, ingots, 2s. 3d. per lb. Antimony, English, 99 per cent., £190 Cs. 0d. Quicksilver, ex-warehouse, £72 0s. 0d. Nickel, £600 0s. 0d. Aluminium, ingots, £180 0s. 0d.; aluminium bronze (BS1400), AB1, £258; AB2, £269.

* Average 68–70 per cent.

Throw away

your labour-wasting lifting device

ONLY £66 buys you the WORLD'S BEST 5 cwt ELECTRIC HOIST:

ACROW DEMAG BANTAM

This rock-bottom price of £66 even includes Push-Button Control Handle and Chain Collector.

Guaranteed by DEMAG-ZUG, world's largest hoist makers

Sole U.K. Agents for Demag-Zug, Wetter

ACROW (ENGINEERS) LTD., Demag Division,
SOUTH WHARF, LONDON, W.2. : AMBassador 3456 (20 lines)

LOW PHOSPHORUS
REFINED & CYLINDER
HEMATITE
MALLEABLE
DERBYSHIRE
NORTHAMPTONSHIRE
SWEDISH CHARCOAL

PIG-IRON

WILLIAM JACKS & CO. LTD.
LONDON, E.C.2.
Winchester House, Old Broad Street
London Wall 4774 (6 lines)

FERRO SILICON 12/14%
ALLOYS & BRIQUETTES
N.F. METALS & ALLOYS
LIMESTONE
GANISTER
MOULDING SAND
REFRACTORIES

And at :—

BIRMINGHAM, 2. 39, Corporation St., Midland 3375/6
LIVERPOOL, 2. 13, Rumford St., Central 1558
GLASGOW, C.2. 93, Hope Street, Central 9969

New Patents

(Copies of complete specifications are obtainable from the Patent Office, Sales Branch, 25, Southampton Buildings, Chancery Lane, London, W.C.2, price 3s.)

806,576. Hunter Engineering Company, 1495 Columbia Avenue, Riverside, Calif., USA.

Means and apparatus whereby a sheet, strip or bar or rod of metal may be continuously cast, with, according to the invention, such uniformity in quality and freedom from inclusions that the resulting casting may be treated to form a final product exhibiting the maximum properties of the metal.

806,803. British Iron and Steel Research Association, 11, Park Lane, London, W.1.

The casting of metal, in particular continuous casting, in which the liquid metal is poured into an open mould and is withdrawn from the mould as a partly-solidified billet. An objective of this invention is to enable the billet to be released from the mould with the minimum of difficulty, while reducing the chances of rupturing of the billet skin.

806,942. Sunbeam Corporation, 5600 Roosevelt Road, Chicago, 50, Ill., USA.

Sole-plates for electric irons, cast as a composite metal, *i.e.*, aluminium for lightness, with an ironing surface of stainless steel for resistance to scratching.

806,991. Phœnix-Rheinrohr, A.G., Vereingte Hutten- und-Rohrenwerke, Ronsdorferstrasse 130/180, Düsseldorf, Germany.

Apparatus for casting under reduced pressure. This method, which is claimed to be simpler and quicker and less expensive than previous methods, does not require either a vacuum chamber or an intermediate vessel. Also the joints which need to be sealed are considerably fewer in number.

807,038. R. W. Taccone, 28 Chautauqua Boulevard, Erie, Penns., USA.

An improvement on the "jolt" method for compacting granular material to provide a solid lining when casting articles in deep cavities in moulding sand.

807,044. Corn Products Refining Company, 17, Battery Place, New York, N.Y., USA.

New core-binders, and a process for making cores suitable for use in the production of metal castings. To 100 parts of sand, there is mixed 0.25 to 2 parts of a cereal binder, 0.5 to 5 parts of a sugar, such as dextrose, sucrose or fructose, and 0.002 to 1.05 parts of an inorganic adjunct selected from the group consisting of: hydrochloric acid, sodium chloride, a mixture of paraformaldehyde and ammonium chloride, a mixture of paraformaldehyde and hydrochloric acid, and boric acid—but excluding vegetable gum. Sufficient water is added to mill the mix, which is subsequently baked at a temperature of at least 350 deg. F.

807,319. Griffin Wheel Company, 445 North Sacramento Boulevard, Chicago, Cook, Ill., USA.

Foundry moulds, in particular those adapted for use with pressure casting apparatus. (See also B.P. 721,065.) The molten metal is forced upward under pressure through a gate, and thence into the bottom of the mould cavity. A stopper moves down to close the gate, after the cavity has been filled with molten metal.

807,363. Eisenwerke Gelsenkirchen, A.G., Hohenzollernstrasse 2-4, Gelsenkirchen, Germany.

An improved method for the casting of hollow metallic bodies having a closed end.

807,531. Patentverwertungsgesellschaft fur Eisen und Metalle, m.B.H., Salzkotten, Westphalia, Germany.

Process for the production of castings, particularly from melts of iron and its alloys including steels, but applicable also to non-ferrous metals such as aluminium containing impurities, in the form of oxide-slag inclusions, capable of being reduced by hydrogen. This is effected by a gas treatment of the melts. Hydrogen is introduced either as a hydride, such as calcium hydride or magnesium hydride. Claims are also made in this invention for the hydride pastilles to be coated with paraffin, plastics, or encased in sheet-iron capsules.

807,633. W. C. Cheney, 404 South Oak Street, Lake City, Minnesota, USA.

Cast light-metal pistons for internal-combustion engines of the fuel-injection type. This type of piston has a ferrous-metal insert in the head portion to receive the high-velocity jet of fuel injected.

807,673. George Blair & Company, Limited, Armond Carr Works, Tow Law, Durham.

In the casting of articles in iron and steel it is proposed to have one or more holes in each mould perpendicular to the moulding surface normal to the direction in which the moulded article is to be ejected. Push rods are employed, adapted to enter and partially occupy these holes so that when the molten metal is poured it flows into these holes until it comes up against the ends of the push rods. On cooling, pips are formed on the surface of the moulded article, the casting being forcibly ejected from the mould on cooling by pressure exerted by the push rods on the pips. These pips can be easily removed from the castings, after the latter have cooled, by machining.

New Catalogues

Machining Facilities. No better service can be given by a steelfounder than to accord to his customers machining facilities. F. H. Lloyd & Company, Limited, James Bridge Steel Works, Wednesbury, South Staffordshire, have issued a magnificent brochure detailing the plant the company has available for machining large-size steel castings. Seldom has the reviewer seen a more impressive picture than the central double-page spread showing an excellent colour printing of a 22-ft. Froriep vertical borer. The brochure is beyond doubt one of the finest ever issued by the foundry industry, the photography and printing being of a particularly high standard.

Sawdust Extraction Plant. Folder No. 65 issued by Dallow Lambert & Company, Limited, Thurmaston, Leicester, is of interest to master patternmakers and founders who operate patternshops. It describes and illustrates a number of plants the firm has installed for the purpose indicated by the title, and terminates with a series of excellent maintenance hints.

The death has occurred of Mr. JOHN CARSON, a former manager of Harland & Wolff, Limited, ship-repairers, of Bootle, Liverpool. He joined the Liverpool staff of Harland & Wolff in 1913 as chief draughtsman, after serving an engineering apprenticeship with Barclay, Curle & Company, Limited, Glasgow, and later with William Denny & Bros., Limited, Dumbarton. He held the position of manager of the Bootle works from 1917 until he retired in 1955. Mr. Carson was a past-president of the Liverpool Marine Engineers and Naval Architects' Guild and also served as chairman of the Liverpool Dry Dock Owners' and Repairers' Council.